The Builder.

VOL. LXVIII. NO. 2721. MARCH 30, 1895

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St. Sophia, Constantinople.—II.

IN our previous article on St. Sophia as illustrated in Messrs. Lethaby & Swainson's monograph (see page 213 *ante*) we considered some of the points raised in regard to the construction of the great typical Byzantine building. But bold as the method of construction was, it was not calculated to produce a satisfactory internal effect in itself, if nakedly shown. A stone church of such design, with the domes symmetrically built on centreing, might produce a grand and perfectly satisfactory interior if left unadorned. But in St. Sophia the internal structure was a skeleton only, intended to be covered by decorative materials which, though leaving the main lines and surfaces of construction visible in their technical relation to each other, were to hide the comparatively rough and crude brickwork, put together by methods which produced a stable construction, but which, if left unconcealed, would have had a very unsymmetrical effect to the eye. We have already remarked on this in reference to the curious system employed in building waggon-vaults and cross-vaults without centreing, and in which the bricks were canted in various directions in order to facilitate the task of building them in such a manner as to be self-supporting. There was no intention that these expedients should challenge observation in the completed building. They were the structural core only, of which all that was demanded was that it should stand firm in its place, as a series of surfaces to which decorative materials could be attached. If we follow out the process in our minds, it may seem that this adoption of an internal veneering of decorative material, which was to become such a characteristic of Byzantine architecture, was really an inevitable result from the modes of construction employed. A Gothic vault, with the ribs built up first on centreing, can be filled in between these ribs in a manner sufficiently symmetrical and finished to be agreeable to the eye, especially as the whole is controlled by the strongly-marked and symmetrically-arranged lines of the groin-ribs. We do not say, of course, that the vaulted surfaces were always or even generally, in Mediæval work, left or intended to be left as uncovered masonry—but they can be so left without disagreeable effect. A Byzantine dome or vault could not be. It left a motley surface of brickwork arranged in any way in which the courses could best support each other, and with no leading or dividing lines to control them. The collection of diagrams of Byzantine vaulting in Choisy's illustrations will render this obvious to any one. Internal lining was therefore a *sine quâ non*, as far as the vaults were concerned; and the demand for it in the roof led naturally to carrying out the same system on the walls, if it was desired that the whole interior should be harmonious and in keeping. The ambition of Justinian to produce a splendid interior, regardless of cost, no doubt contributed to the special lavishness of the interior decoration in St. Sophia; but the employment of such an inner skin of decoration was an essential element in the style.

In regard to what is in some respects the most important and most interesting portion of the decorative lining, the mosaics in the domical surfaces, the authors are entirely sceptical as to figure decoration having been any part of the original scheme. Their reasoning is, we think, conclusive. In the first place, not a word is said about figure-subjects in the poem of the Silentiary, who, considering that he spends so much detailed and rapturous description over such things as the method of lighting, &c., would certainly not have omitted to celebrate any important pictorial decoration, had there been any to celebrate. Secondly, that such figures, had they existed, would unquestionably have been destroyed during the outbreak of iconoclastic feeling in the eighth century, when sacred pictures were forbidden. We do not attach so much importance to this last reason in itself, because it might have been thought too much trouble to destroy a large area of mosaic work, especially when it was almost necessary to replace it with some other design; but the absence of reference to pictures by the Silentiary, coupled with the historic fact of the iconoclastic outbreak, seems conclusive. Then comes the question, How were the domical surfaces originally adorned? Quoting the Silentiary's statement that "at the highest point was depicted the Cross, the protector of the city," they suggest that near the apex of the dome a great cross extended four arms over the central space, the interspaces being powdered with stars, and that stars were also used on the ground between the ribs of the dome. They mention a reference to stars in the Silentiary's poem, but we do not identify the passage in their translation. The idea of the cross as a decoration on the domical surface is, however, curiously confirmed and illustrated by the crosses in the mosaic of a small vault compartment next the bema, of which a sketch is given in the book. These are crosses of the Latin form, not the equal-armed Greek cross, and they seem to be set according as they will best fill the surface, that in the lower and narrower portion of the vault being set vertically; the next, which comes on a wider part of the vault; being set across, at right-angles to the first one. This strikes us a very naïve method of decoration, and we can hardly understand the satisfaction with which the authors (who have obviously taken everything Byzantine under their protection) seem to regard it. It is highly characteristic, no doubt, of the scene and the time, but it is not a form of decoration which displays any thought, or which is in any way specially suited for the surfaces of vaulting in a general way. The central cross in the centre of the large dome may have done well enough; there it would be appropriately placed as a matter of form, and as a central symbol would have had a striking effect; but to praise, as the authors do in one passage, the decoration of a dome by putting small crosses all over it, is certainly further than we can go.

It is rather a question whether the internal effect of the dome gains by the introduction of the ribs. This is a part of the whole question of the most effective treatment of domical surfaces, which depends to some extent on how one regards a dome in the constructive sense. We are inclined to think that a masonry dome is more properly to be regarded as an expanse of domical surface than as a collection of arched ribs placed close together; and that, therefore, a treatment which gives it an unbroken surface is more true, as well as grander in general effect, than one which it breaks up into vertical slices. The ribs somewhat take away from the mystery of the dome; and if it is assumed, as seems probable, that the principal decoration was a star powdering, the rib treatment certainly must have taken

away all truth of suggestion from that form of decoration. As to the absence of figures in the original mosaics, that may be considered to have been no loss to the church as Justinian built it. Figures in domes on such a scale and at such a height must either be too small to have any effect, or, if large enough to be seen, must destroy the scale of the building, as was the case with the immense cherubim subsequently introduced in the pendentives, and which have figured in so many illustrations, including the curious attempt at an interior perspective view in Grelot's book.

It is argued by the authors that the ground, and any patterns evenly distributed over the vaults, are of the original work, because the labour and cost of removing the whole large surfaces of tesseræ would never have been incurred, though figures on a part of the surface might have been inserted, or removed and their place filled up. The actual size and spacing of some of the tesseræ is given in a diagram; they hardly average more than a quarter of an inch square, were spaced about half their width apart, and fixed in the cement at an angle, so as to be normal to the line of vision, or approximately so; a method which, as our readers may remember, has been adopted in the mosaics recently carried out in St. Paul's.

The marble veneer which forms the decoration of the walls is put on in what may be called a very non-constructive manner, there being no pretence of the imitation of bonded masonry. The larger slabs were mostly placed vertically, dark and light slabs alternating, and the whole intersected by narrow horizontal courses. The main piers were of stone, but this, say the authors, was only for strength, as they were not intended to be seen any more than the rough brickwork. One rather important point is mentioned by Procopius in regard to the construction of the great piers: "Of these stones, those which make the projecting angles of the piers are cut angularly *(engonios)*, while those which go in the middle parts of the sides are cut square." There is no comment on this, as far as we have observed, in the book. The meaning we take to be that the angle-stones were cut out into solid returns, so as to tail into the masonry on either hand. Something of the same kind is to be found at times in internal (not external) angles of Mediæval masonry, where the stones are cut out from the solid into the shape of the angle. In regard to the joining of the veneer to the brickwork the following passage is of interest:—

"The building completed in this form (in the rough walling) we must remember was made up of vast masses of thin bricks, of which the mortar occupied probably a half of the aggregate; this had to thoroughly settle down and dry before the rest of the marble masonry was inserted, and the wall casings applied. The marble work, however, was all the while being prepared, and, the building once ready, the windows were inserted as screens in the openings previously left; marble jambs and lintels for the doors were placed in position also, with windows above them filling out to the brick arches. The walls were then sheeted with thin marble covering, the vaults were overlaid with mosaic, and the pavements were laid down. In this way, as the bricklayers had not to wait for the masons, the carcase was completed in the shortest possible time; and by reserving the application of the marble till the structure was dry and solid, it was possible to bring together unyielding marble and brickwork that must have settled down very considerably."

Nothing in St. Sophia is of more interest than the treatment of the carved work in the capitals, a subject into which the authors have gone at considerable length and in a very instructive manner. The relation of the Byzantine to the Classic capital shows a peculiar mingling of likeness and difference, both in the general design and in detail. Everywhere we find the reminiscence of the Classic capital, as far as detail is concerned, but with a complete change in outline, and a very marked and peculiar modification in detail. The acanthus leaf of the Classic capital is constantly to be met with, but changed to an extraordinary extent, in style and expression, by means of very small modifications in detail, which yet entirely alter its character. It becomes stiff, bristling, pointed, sparkling, with a new life and vigour infused into it. The Ionic volute is sometimes present in a form, proportion, and position very like the original, as in the capitals of the grand floor arcades; in other places, as in the capitals of the upper arcades, it is a mere reminiscence of the old form, almost crushed by the characteristic Byzantine block, a frustum of an inverted cone, over it. In the capitals of the lower or "great order" the volute appears in its proper place at the upper portion of the capital, with only an enriched abacus moulding over it; in the capitals of the upper order, a column of which is shown in fig. 1, it is at the bottom of the capital, and serves to assist in the change from the cylinder of the column to the square of the capital, by falling in beneath the angle of the latter. This upper order capital (fig. 1) is a

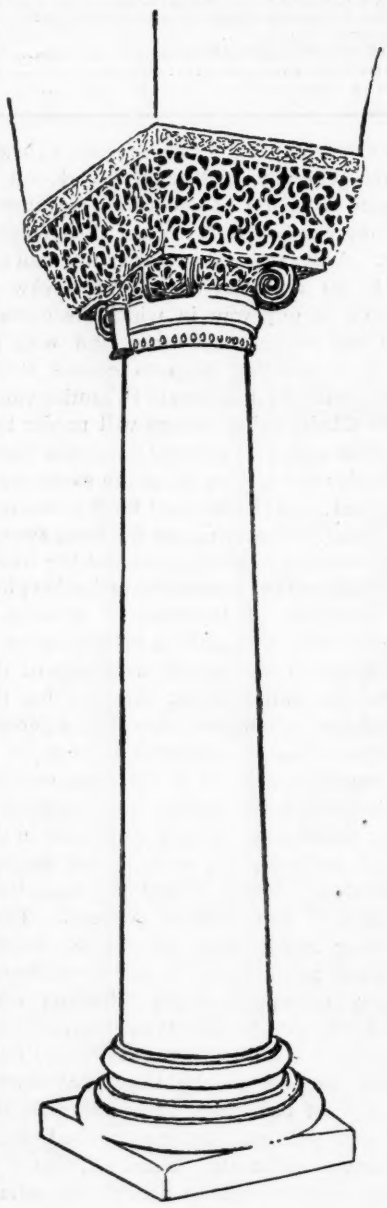


Fig. 1.

remarkable feature in every way, more especially in its extraordinary divergence from the form of the lower order capitals. In the latter, with the exception of the slightly convex (instead of concave) form of the bell, the general outline and proportion of the Classic capital is quite recognisable; in the capital of the upper order (fig. 1) all trace of the Classic capital, as to the general form, has vanished. As the authors observe, the general form seems to be the result of the effort to evolve a capital which, while seating itself on a cylindrical column, should be fitted to form a broad impost for an arch to spring from. This use of the capital necessitates a pretty wide spread towards the top, combined with great mass and solidity. In accordance with these requirements, the foliage in relief, characteristic of the Classic Corinthian capital, has entirely disappeared, and the decoration is obtained by sinking from the surface. With this new method of execution the style of ornamental design has entirely changed, and we see, instead of the broad leaves of the Classic capital, a collection of rather thin forms marked out by deeply cut narrow hollows between them. This decoration, while extremely light and effective, has the merit of preserving nearly all the solid mass and strength of the block, which is hardly affected by the narrow sinkings necessary to define the design. This method of producing design from the flat by sinking hollows between it is characteristic of Byzantine work, and is curiously illustrated in a piece of ornament on an impost moulding (fig. 2), where we see old forms of Greek ornament assuming quite a new life and character from their production in this counter-sunk manner. The column shown in fig. 1 illustrates another point in the treatment of the columns in St. Sophia, the use of a bronze ring as a necking. These metal rings, which were gilt, and were used at the junction of the shaft both with capital and base, obviated the cutting away of the material of the column to provide astragal and apophyge, served to bind the column together against the tendency to crack under the superincumbent weight, and had also, the authors suggest, another practical value, which, however, we do not believe was contemplated by the builders. This was, according to their suggestion, to prevent the lead sheets inserted in the joints from spreading under pressure. They would have this effect, perhaps, practically; but it is obvious from the

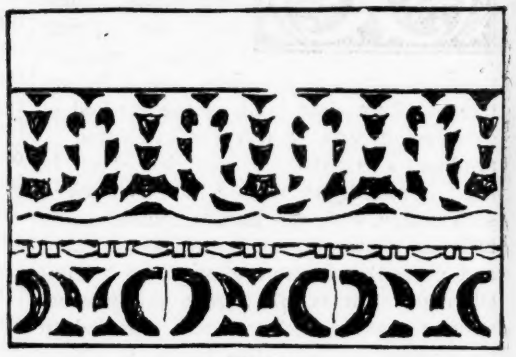


Fig. 2.

contemporary descriptions, that the practice of leading the joints was considered a panacea for the effects of any uneven pressure. The stones of the great piers, Procopius tells us, "are fastened together, not with lime, called unslaked (*asbestos*), not with asphaltum, the boast of Semiramis at Babylon, nor with anything of the kind, but with lead, which, poured into the interstices, has sunk into the joints of the stones, and binds them together." The fact which modern experiment has shown, that lead joints under pressure are likely to split the stone by spreading, seems to have been quite unsuspected at that time, and therefore one can hardly suppose that the metal bands at the leaded joints of the columns were put there to avert that mishap.

The lighting of St. Sophia was evidently one of the points in the interior effect of the building which most struck and delighted the spectators when the building was new. As described by Paul the Silentiary, who rises to his most poetic mood on the subject, the main lighting was from a great central corona suspended by light chains descending from the margin of the dome and meeting in a central pendant circle. He speaks also of numerous other hanging lights, some in the form of ships, carrying, as he says, "freights of flame," and also of the standard lights on the silver columns of the Iconostasis, which were designed in branches springing from a central stem and widening downwards to the base; "these one might compare to the mountain-nourished pine, or cypress with fresh branches." But the majority of the lights were hung by chains from the ceiling into the centre space;

a most effective and beautiful manner of lighting a building.

The authors have endeavoured to trace out, among existing examples of hanging lamps, some which may serve to illustrate the probable appearance of the St. Sophia lamps. Of these some interesting illustrations are given in the book. One of these (British Museum), is a flat bronze disc, pierced with holes round the edges for lamps, the middle portion cut into a ray pattern. If we imagine glass lamp vessels inserted in these holes, this would almost exactly answer to the description of the Silentiary :—

"And beneath each chain he has caused to be fitted silver discs, hanging circle-wise in the air, round the space in the centre of the church. Thus these discs, pendent from their lofty courses, form a coronet above the heads of men. They have been pierced too by the weapon of the skilful workman, in order that they may receive shafts of fire-wrought glass, and hold light on high for men at night."

The design of the example given in the book is hardly of that date, but it probably represents very closely the kind of lamp used in St. Sophia. Of the peculiarly picturesque type of lamp mentioned by the Silentiary, that in the form of a ship, no illustration is given—possibly there is none to give. The idea seems peculiarly typical both of Byzantine and of early Christian fancy. The authors quote Paulinus in regard to the effect of the lights at his church at Nola, which "were suspended in such profusion that they seemed to float in a sea." The simile seems to suggest a certain connexion of ideas with the ship form of lamp.

Into all the points in the book, which is crowded with matter, we cannot profess to go; but some of the illustrations are curiously illustrative of the peculiar character of Byzantine work, which is almost unmistakable, but is so difficult to define. One thing that strikes one in Byzantine detail is perhaps a kind of unexpectedness. Capitals and other details appear at first sight Classic, and yet they differ essentially from Classic types; mouldings are of quite different profiles from what one meets with elsewhere. In this latter respect the Byzantine architect hardly shone. His mouldings are somewhat coarse in profile, having lost the refinement of the Greek type and not acquired the force of the Mediæval type of moulding. One characteristic of Byzantine taste seems to be a love of oval forms. We see this illustrated in the book before us, in the plan of the font from Constantinople (fig. 10), in the water vessels in fig. 11, in the curious and most characteristic "phiale," like a half melon stuck on a pole, in fig. 27. In many other ways the Byzantine spirit is discernible at a glance, yet without one being able exactly to say in what it resides. The bronze door of the narthex, for instance (fig. 67 in the book); what is it which gives that peculiar unmistakable "Byzantine" appearance? Perhaps the most characteristic feature is the crosses in the panels, with their arms thinnest at the crossing, and enlarging outwards. The strap-like ornaments on the stiles of the doors have their effect, too; but it is the crosses which give most distinctly the *cachet* of the time.

It was an era full of "something rich and strange" in art, mingled with a certain hint of barbaric character which perhaps gives it part of its peculiar interest, and which would probably be discernible enough in the interior of St. Sophia if we could see it as it first left the decorators' hands. The building itself, one may say, was grand in conception, crude in execution; in its outward architectural treatment even clumsy. But it is the most remarkable and interesting architectural interior ever erected, and as at first completed probably the most wonderful in effect. We have only touched on a few of the many points in regard to it which are dealt with in the book before us. In fact, every page of the book suggests something of interest; there is no padding in it; we only wish the matter had been a little more systematically and readably arranged. But the book is an important and useful addition to English architectural literature, and is not without much matter for more general and popular interest.

NOTES.

THE Dean of Peterborough writes to the *Times* that the renowned west front of the cathedral has suffered severely during last Sunday's storm. Four of the pinnacles have been injured or destroyed; that is not of so much consequence—pinnacles can be replaced; but it is implied that the whole front may be in an insecure condition. This is a matter of national—we might almost say of world-wide interest, and we shall look anxiously for the result of the examination which is to be made by Mr. Pearson. If funds are wanted to render this grand front secure, the Dean will be fully justified in making an appeal, as he says, beyond the limits of the diocese; and there can be little doubt, we should hope, that it would be largely responded to.

THE case under the London Building Act reported in our legal column, in reference to Nos. 1 and 3, Church-street, Minories, raises a curious question, one of the many which will be likely to arise as to the interpretation of the Act. The question, as will be seen on reference to our report of the case, is whether, when a building has been more than half destroyed or pulled down, with the exception of the party-wall, the latter is to be required to be rebuilt as a new party-wall. In the first case in connexion with the site the building on one side of the party-wall was not destroyed sufficiently to constitute it a new building, and in that case we are of opinion that there was no ground for rebuilding the party-wall. But now notice has been given for rebuilding the other adjoining building, which had been destroyed for more than half of its cubic contents, and the District Surveyor claims that in that case the party-wall, though it has not been destroyed for half its area, must be rebuilt as a part of the new building. There was, it will be seen, a practical ground for the contention, as it is admitted that the party-wall is badly built. The magistrate, however, has ruled that Section 208 of the Building Act, which orders the rebuilding of a party-wall as "new" when it has been destroyed for half its superficial area, takes the party-wall out of the jurisdiction of Section 5 (6), which schedules as a "new building" any building which has been destroyed to the extent of half its cubical contents. The result of this would be that the party-wall is no part of a building! This, however, is directly contrary to the wording of the Act, in Section 5 (16), where a party-wall is defined as "a wall *forming part of a building*, and used or constructed to be used for separation of adjoining buildings belonging to different owners," &c., &c. There can surely be no doubt as to the intent of that, and very little doubt as to the legal force of the words. Section 208 appears to be really intended to provide for the case when a party-wall has been taken down to more than half its superficial extent without the adjoining buildings being taken down. The decision appears to us to be wrong both in regard to the wording and the intent of the Building Act, and we should doubt if it can be upheld.

WE have devoted some space to the Building Exhibition at the Agricultural Hall, as such large claims have been made for it, but we must say that we see no essential distinction between this exhibition and previous ones. The hall is rather better filled than before, the catalogue is more compact and was ready in time, but the exhibition is otherwise just what it was before; an exhibition for trade advertising, not for the illustration or advancement of building construction or materials. In some cases we noticed what were practically the same exhibits of the same firms standing in the same place as last year; and wherever the visitor turns (especially if he is seen to make a note on the catalogue) there is the agent of the exhibiting firm on the watch to thrust prospectuses into his pocket. All this may be for "the good of trade," but it is absurd to expect one to think that it has any other aim or result. The only way to make a building exhibition that would be worth calling such, would be to restrict the exhibition to inventions or materials which have some novelty or special interest, and for a strong committee of architects, engineers, and master builders, to exercise control over the exhibits, having the right to reject any proposed exhibit they do not think worth its space, and to entirely prohibit touting and "circularising" in the building. An exhibition got up on these lines, say once in five years, would be really useful and interesting; but these shows as they are now managed are nothing more than advertising media. The lectures and conferences to be held during the exhibition may be of some interest: their dates will be found in our "Meetings" column.

A CORRESPONDENT, in our issue of last week, made a complaint against a District Council for the low salary paid to the Road Surveyor, viz., 120*l.* a year, from which it was assumed it would be necessary to deduct the cost of a horse owing to the large area of the roads. It is much to be hoped that the new District Councils, which now, in most counties, are becoming the Local Highway Authority (though in some counties the operation of the Local Government Act, 1894, has very injudiciously been postponed for three years), will pay their surveyors an adequate salary. At the same time it has to be borne in mind that the main roads, and, therefore, the most important roads, are under the control of the County Council, and that the keeping in repair of the ordinary county roads is not a thing which requires so much skill and large technical knowledge as common sense and careful supervision of labour employed. To take care that metal is put on at the right season of the year, to see that ditches are kept clear, and hedges properly trimmed, so as to let wind and sun play on the surface of the road, are not tasks which are beyond the power of any man who is capable of being a competent farm overseer. It has also to be borne in mind that the County Council may, and often does, give grants towards the roads which are not main roads so long as certain conditions are fulfilled, and it is the duty of the County Surveyor to see that these conditions are carried out. The really important highway functionary in rural England is now, in truth, the Surveyor to the County Council, and he cannot be too well trained or too energetic.

A REPORT on the working of the Richmond Main Sewerage Works, "for the three years ending March, 1894," has been prepared by Mr. Wm. Fairley, A.M.Inst.C.E., the Resident Engineer of the Sewerage Board. It is a clear and interesting statement, and affords further evidence of the magnitude and difficulty of the sewage problem, a problem which seems well-nigh insoluble. Certainly the treatment at Richmond appears satisfactory, purifying sewage to the amount of about 2,000,000 gallons a day (about 45 gallons per head of population), and that with a filter area of only 1½ acres. A system, however, which, besides the mechanical operations of straining and pumping, requires the addition to the sewage, *firstly*, of a small dose of diluted carbolic acid and iron salts, *secondly*, of a dose of milk of lime, *thirdly*, of block alum and carbferalum (a compound of sulphate of alumina, carbon, and iron), and which further requires the filtration of the effluent and an expensive method of sludge-

disposal by adding lime, pressing into cakes, and carrying away by barge—such a system cannot be considered quite the ideal one. It is, however, an example of chemical treatment thoroughly carried out and giving satisfactory results.

MR. ARTHUR WRIGHT'S sliding-scale system of charging for the electric light, which has been used by the Brighton Corporation for over two years, has proved a success. In his report to the Electric Lighting Committee he shows very clearly the reasons which led him to propose the system, and that practice has entirely justified them. The conditions of the supply of electricity are quite different to those affecting gas. With gas, a comparatively small plant, kept continuously working, can store it economically in a gasholder, so that the plant is thus able to meet large demands for short intervals, for which it would be quite inadequate if the gas were supplied direct from the retorts. On the other hand, it is very much cheaper to make electricity as it is wanted and supply it direct than to store it for future use. In residential buildings the average daily time during which a lamp is lit throughout the year is from one hour to one hour and a-half; yet, during the other twenty-two or twenty-three hours, the electric supply station has to keep in readiness machinery capable of giving current to that lamp should the user require it. The company, therefore, require to have machinery capable of simultaneously lighting all the lamps connected to their mains. From this it is evident that it is not those customers who pay the largest meter bill that are the most profitable, but those who keep their lamps burning the longest. To encourage this deserving class, the following tariff has been adopted:—7d. per unit for the first hour, and 3d. per unit afterwards. The effect of this is that lamps are fixed where they are used for the longest number of hours, and are now found in passages and kitchens, whereas, formerly they were only used in shop-windows and drawing-rooms. In fact, a customer who uses the light regularly for more than two hours a day will pay less light for light than for gas at its present price. It is highly probable that many London companies will follow suit, and adopt a sliding scale. Bournemouth has already done so. The Corporation of Brighton are to be congratulated on their enterprise in initiating this system. During the two years working, their business has nearly quadrupled, and the revenue obtained per horse-power per year increased from 15*l.* 12s. 4d. to 16*l.* 8s. 4d. There was one of Mr. Wright's suggestions which the committee did not adopt, namely, "To abolish all meter rents, except to those customers who use the light on an average less than one hour per day throughout the year." Instead of this they resolved to reduce the rent of meters from 5s. to 2s. 6d. per quarter.

THE recent case of Helfer *v.* the City of London Electric Lighting Co., reported in the March number of the "Law Reports," has made it clearer than ever that the Court of Appeal is disinclined to allow damages to be given to a plaintiff instead of the granting of an injunction, unless it is most clearly established that a sum of money will adequately compensate him for an injury done to his property. Considerable discussion has taken place on this point in the Chancery Courts in reference to infringements of rights to light, in which cases it has often been argued that damages should be awarded in place of an injunction. In the case under notice the injury was caused by the vibration of machinery. We do not propose to refer to the facts, but what Lord Justice Smith terms a good working rule, under which damages may be given instead of an injunction, is well worth quoting. He lays it down thus:—(1) "If the injury to the plaintiff's legal right is small, (2) and is one which is capable of being estimated in money, (3) and is one which can be adequately compensated by a small money payment, (4) and the case is one in which it would be oppressive to the defendants to grant an injunction—then damages in substitution for an injunction may be given." It is obvious that in few cases, whether of the infringement of rights of light and air, or of injury by noise, can these several elements always be found, so that it must be taken that injunctions will be granted by the Court except in very exceptional cases.

WE have received some drawings of the alterations which are being effected at the Berlin Schloss, which serves as the town residence of the German Emperor. The deceased Emperor William I. used a modest residence in the main thoroughfare, Unter den Linden, and the Emperor Frederick never lived to move out of the Palace he held as heir-apparent. There is no doubt that the Schloss lends itself much better than any of the smaller Palaces for the purposes of the more ceremonial Court kept up by the present Sovereign. The large suites of reception-rooms and the Chapel Royal, which were formerly but seldom opened, are now more frequently used, and their vicinity to what may be termed the Imperial private residence under the same roof has great advantages. The block, however, required modernising, and in many cases improvements of an extensive nature, and these have been gradually taken in hand. The latest extensive alteration is the remodelling of the historical "White Hall," which was last decorated by Professor Stüler in 1844. The Court Architect, Herr Ihne (one of the foreign correspondents of the Royal Institute of British Architects), has carried out the work very successfully. The alterations included the remodelling of the grand staircase, and the addition of a *foyer* about 130 ft. long and 25 ft. wide.

TWO concurrent projects are in the field for rendering honour to the memory of Mrs. Siddons. It is proposed to erect a statue at Brecon, where is the house, latterly the "Shoulder of Mutton" Inn, where she was born on July 5, 1755. Many contributions have been made also to the fund wherewith it is intended to place over her grave at Paddington a more befitting monument than the large flat stone which now marks the place of her burial. She died, in 1831, at No. 27, Upper Baker-street, until a few years ago the Portman Estate Office, and was interred in the "new" burial-ground at the rear of St. Mary's Church, Paddington Green. Close by may be seen the memorial-cross erected to Collins, R.A., by his widow and daughter, the grave of Haydon, who ended his unhappy life at No. 1, Burwood-place, Edgware-road, and the site of the old St. James's Parish Church, built *circa* 1680. The church-yard, extending to about three-and-a-half acres, was opened to the public ten years ago, having been laid out at the joint expense of the Vestry and the late Metropolitan Board of Works.

PROFESSOR CHURCH'S Report to the First Commissioner of Works on the condition of the frescoes in the Houses of Parliament states that two pictures in the Peers' Robing Room are so far gone that he thinks "there is not enough of them left to admit of their being restored." Fifteen days have been spent in operations on the "Wellington" and "Nelson" pictures, of which Professor Church speaks hopefully, but urges that every effort should be made to maintain a uniform temperature of not less than 60 deg. Fahrenheit in the Queen's Robing Room and the Royal Gallery. This suggests an important consideration in regard to the future decoration of public buildings with wall paintings; for it seems that we may come to the position of inserting pictures which are at once so valuable and so difficult to keep in repair that we may have to consider the building as a picture gallery, and make the preservation of the pictures the first consideration in regulating the temperature of the interior.

THE exhibition of works by Van Marcke, the late French cattle painter, at the Goupil Gallery in Regent-street, though small, is a typical and very interesting one. It includes works which show the powers of this able and masculine artist at his best. The solidity and thoroughness of his painting of cattle could hardly be more finely illustrated than in "The White Cow" (15), which seems to stand out as if alive in the landscape, and there is a unity about the whole composition which makes it in the true sense a "picture." "La Belle du Troupeau" (31), in which a dark-coloured cow stands in a shaded pool, has the same kind of pictorial unity, and in its tone and effect perhaps recalls more than any other work in the room the artist's master, as he called him, Troyon. "The Dun Cow" (34), is another very fine work. Van Marcke no doubt to some extent sacrificed his landscape to his cattle; his dull greens and sometimes rather dirty skies are hardly Nature, but they fall into their place as the background to the cattle, which are the main objects of his study. There is one small landscape, however, "At Yport—A Quiet Afternoon" (30), which, though also subdued and unreal in tone, is exceedingly beautiful in composition and sentiment, a work that grows upon us as it is studied.

FROM a statement in the *Times* it appears that the proposed removal of the houses in Poets' Corner and Old Palace Yard, which is a necessary prelude to the carrying out of any such scheme of a monumental chapel as has been talked of, is likely to be shortly realised. This we are glad to hear, for in any case the removal of the houses will open out a fine new view of the Abbey from the east. But we hope nothing will be done precipitately as to the proposed "chapel." Our belief is that the public do not want it, that it will be an excrescence on the Abbey, and that, even if built, burial within it will not be regarded, as a matter of sentiment, in the same light as burial in the Abbey.

BUILDING TRADES EXHIBITION.

IN commenting on the various exhibits at the Agricultural Hall, it may be most suitable to commence with the raw material.

Bricks, and clay materials generally, formed a great part of the exhibition, and a number of firms, we understand, employed Messrs. David Kirkaldy & Son to carry out crushing tests for the occasion. The results of all these are not yet available, but we may give the following statistics showing the greatest and least strain which the several bricks mentioned withstood. Six specimens of each kind were crushed; all were wire-cut.

Strength of Bricks.

Name of Firm.	Locality.	Description of Brick.	Crushed Stress in lbs.	
			Lowest	Highest
Mason & Watson..	Napton-on-the-Hill, nr. Rugby	Light brown	155,100	237,200
Gillingham Pottery, Brick and Tile Co..	Gillingham .	Red.....	141,800	168,100
Ravenhead Sanitary Pipe and Brick Co.	Ravenhead, St. Helen's .	Reddish brown..	194,200	228,400
F. Jewson ..	Erith, nr. St. Ives, Hunts....	Yellow	94,500	117,820

It is usual in these cases to give the mean results, and to take them as indicating the actual strength of the bricks concerned, but we think it more useful to quote the maximum and minimum stress as showing range of possible variation. We cannot allude in detail to the numerous brick exhibits; one was very much like another, but

the following stands attracted our attention:—Messrs. Ellis, Partridge & Co., of Leicester, had erected a polygonal structure, on which were crowded a miscellaneous assortment of fancy and ornamental bricks and tiles. The "Redbank" brand struck us as being uniform in tint, and, speaking generally, there was an absence of cracks and flaws. The raw materials and firing of these goods must be very carefully attended to in their manufacture to produce such results. Messrs. Candy & Co., Limited, of Heathfield, Newton Abbot, have an equally imposing stand, on which, however, the materials are better arranged. The principal commodity was their channelled paving bricks, which have rather rougher surfaces than the majority of such bricks that have come under our notice—a feature distinctly in favour of the material. White and coloured glazed bricks, enamelled on the surface exposed outwardly when built up, vitreous stable-bricks, fire-bricks, terra-cotta, stoneware-pipes, &c., are amongst the numerous articles shown by this firm. They were all made from the kaolin or china-clay deposits in the neighbourhood of Bovey Tracey. The Stourbridge Fire Brick Company exhibit a large number of fire-bricks and tiles, stove-backs and linings, garden-vases, &c. Messrs. S. &. E. Collier, of Grovelands, Reading, have built a small office on and around which the principal specialty of the firm—red tiles—are grouped. It was impossible not to notice that either these tiles were unequally fired, or the raw earth—presumably mottled plastic clay—was not very well prepared in the first instance; there is a lack of uniformity in tint, even on a single tile in some instances. The material is even, and devoid of spots, however, and the few bricks shown were creditable enough. Messrs. H. Bray & Co., of London and Nottingham, announce that their Fletton building bricks have withstood a pressure of 197·7 tons per square foot—a result hardly worth making so much of; the excellent quality of the materials is sufficient, though, to place them in the front rank. The Grays Chalk Quarries Company, Limited, of Eastcheap, E.C., have a small but interesting exhibit, consisting of divers kinds of bricks made at Grays, in Essex. One, which is stated to be non-porous, is extensively employed in the construction of cisterns and tanks, and possessed a singularly vitrified appearance. Other sets show various stages of firing in the manufacture of glazed bricks; and there was a window opening built of what were described as "decorated" bricks—the less said about the character of the decoration the better. Mr. W. Peck Taylor, of Chancery-lane, was putting up some brickwork on the top of which it is intended to place terra-cotta chimneys, each surmounted by a Gordon's wind-guard, a useful invention. The Albion Clay Co., Limited, of Woodville, Burton-on-Trent, have a large exhibit of stoneware pipes, together with samples of the raw earths from which they are made, which are not fire-clays. Tests show that these pipes, 12 in. in diameter and 1 in. in thickness, are capable of withstanding a pressure of 4,741 lbs.; whilst those 18 in. in diameter and 1½ in. in thickness gave a result of 5,215 lbs. Messrs. Wood & Ivery, Limited, of West Bromwich, exhibit a number of Staffordshire blue bricks, &c. There were several brick-making machines in the bays.

Very few stands are devoted to cements and plasters. Amongst them is one by the Granite Silicon Plaster Co., of King's-road, St. Pancras, N.W., whose specialty, "granite" plaster is of American origin. Judging from its adaption in the Exhibition it sets very hard; but a sample shown to us, set on an iron frame such as is used for partitions and the like, indicated that the plaster becomes rusty-coloured at and near its junction with the iron. It is specially useful for ceilings, lath partitions, and for lining brick walls. Messrs. Samuel Wright & Co., of Amhurst-road, Hackney, have a small exhibit consisting of a fibrous-plaster column and capital, with sundry other samples of their work; and there are two or three cement-testing machines of ordinary patterns in the Exhibition.

The few stone exhibits present no specially interesting features, the materials shown being, for the most part, very well known. Messrs. Groves Brothers, of Milton-under-Wychwood, have a small stand of Taynton and Guiting stones; the former is noted as having been employed in the construction of colleges at Oxford. The materials may be described as shelly oolites of cream tint, the Guiting stone being the darker of the two. Judging from the balustrading exhibited, and which was said to be of stone from Taynton, we do not think much of the material. It exhibited much false-bedding, or banding, the heavier-coloured streaks being shelly; a brown vein disfigures one face of the stone, and we should have to be convinced by better samples than were on view that these oolites are of a very durable description. The Bristol Pennant Stone Firms, Limited, of Fishponds, have a number of tombstones, steps, &c., made of their carboniferous sandstone; the dark blue tones are especially suitable for sepulchral monuments, but when used as building ashlar Pennant stone has a very dismal appearance. Some of it is of a reddish tint, though this is not the prevailing colour at the quarries, a visit to which not long ago led us to the conclusion that any other tone than the dark, bluish grey was extremely variable. It is, however, a durable material. Mr. T. Freeman, of Phœnix-street, N.W., amongst other things, show some good building stone from the Beggar's Well and Battlestead quarries, near Alton, Staffs.; and odd cubes of stone, presenting no features worthy of note, are exhibited by two or three other firms. Of marble, we may point to the stand of Mr. S. A. Macfarland, of Queen Victoria-street, on which are some carefully-executed trade carvings in Sicilian and other Carrara stones; a Celtic cross of some pretension which forms a prominent feature, would be better appreciated if it were not mounted the wrong way about. One or two small pieces of statuary were shown on serpentine pedestals.

Messrs. Arthur Lee & Brothers, Limited, of Bristol, show a large number of what might be styled museum specimens of divers kinds of marbles; the pieces are for the most part too small to enable one to judge of the real appearance of the stones; they were not very well polished and resembled stock exhibits, of a character conspicuously absent from this exhibition as a whole. The Bowstone Company, of Maidstone, have erected a small office of Bevis's Ashlar Building Blocks; and Mr. A. C. W. Hobman, of Bermondsey, shows a staircase in artificial stone of the same kind as at a former exhibition. The Plastic Marble Company, of Berners-street, W., have several examples of their goods, which are made to imitate marble; no one acquainted with that material, however, would recognise much resemblance between the real and the artificial products. The latter, in these examples, are made for the most part in flaring colours, and are, no doubt, suitable for certain purposes where the real stone would be out of place. Perhaps the most noteworthy artificial stone exhibit is that of Messrs. W. Garstin & Sons, of Kensal Green. It consists of steps made of chippings of Enderby granite and lead shots, bound together by Portland cement. The introduction of lead shots is the novel feature, and it is stated that these, which come to the surface of the steps in section, prevent slipperiness, and so they do to a large extent. The shots are not distributed uniformly in the cement, but are confined to within an inch or two of the surface of the steps. In other examples shown, marble chippings were mixed with the granite, and there was a granite step having a number of plugs of lead let in near the edge.

In respect of sanitation there is not a great deal that is novel in the exhibition as a general rule, but the stand of the Albion Clay Company, Limited (No. 109), is a notable exception to the general rule. These exhibitors have especially turned their attention to the unsatisfactory state in which those modern features in house drainage—the intercepting and inspection manholes—are too frequently found after being in use for some time. In many cases, indeed, particularly in the event of a stoppage, these chambers are no better than cesspools, whilst it is quite a common experience to find them exceedingly filthy, and necessarily unhealthy. In the case of the intercepting manhole, Sykes's Patent Interceptor does away with the open channel; the trap is placed within the chamber, with two inspection openings, which are closed by screwed caps (Sykes's patent); thus inspection is easy, the escape of sewer-gas prevented, and the too frequent trouble caused by the cap of the cleaning-arm in the ordinary type falling into the trap is obviated. Air openings to the trap are provided on each side, so that fresh air may be admitted to the house-drains, and, if desired, sewer ventilation provided. For inspection-manholes, improved forms of channel-bends are designed (Jones & Sykes's patent), which are bridged across the outlet-half, and slightly curved over from the top; the outer wall is also curved towards the inner wall of the outlet, and a portion of the bend next the collar or socket is also bridged over and cut off at an angle, so as to conform better with the brickwork. The same exhibitors likewise show some excellent forms of street-gullies and yard-gullies, besides the now well-kuown "Paragon" Pipes and Sykes's patent joint-pipes. All these items are made of an exceptionally high grade of stoneware.

Messrs. George Waller & Co. (Stand No. 45) have an excellent show of various forms of inspection and other manhole-covers, sewer-ventilators, street-gullies, a capital cesspool-pump, penstocks, tide-valves, and flushing-tanks, more particularly suitable for sewer-work.

Messrs. J. Duckett & Son, Limited (Stand No. 114) exhibit, besides various sanitary goods of ordinary type, their patent slop-water closet, in which a tipping-basin, holding three gallons, receives the slop-water from a sink, and discharges it to flush the closet, which is of latrine type. We are somewhat dubious as to the complete removal of soil, but where it is necessary to economise in the expense of plumbing, there can be no doubt that this is a valuable device. Duckett's self-cleansing channel-gulley seems a useful form of this now generally-adopted accessory for sink and other wastes.

Messrs. Wm. Harrison & Co., Limited (Stand No. 162) have a good show of sanitary goods of the usual types, and their glazed supports for sinks are worthy of notice.

Messrs. Freemah Brothers (Stand No. 15) show some good forms of wash-down closets with Sharpe's patent flushing run. They have also some good connexions for stoneware traps and pipes to lead and iron soil-pipes, which are of screw form, and some useful connexions for lead and iron soil-pipes.

The "Aquarius" Patent Pedestal Closet, exhibited by H. Dakin (Stand No. 50), has a simple cemented joint for soil-pipe so arranged that the outlet can be turned for fixing at any angle.

Messrs. F. Richmond & Sons (Stand No. 28) make a feature of their brass connecting thimbles for the junction of soil-pipe and closet which are satisfactory, and admit of disconnexion for cleansing or renewing closet. At the same stand H. F. Buchan & Co. show their brass traps for sinks, baths, and lavatories, which have the merit of side access for cleaning, and effect an economy in wiped joints.

Drain-cleansing apparatus is well shown by H. Hart (Stand No. 29), who stages a number of ingenious and necessary tools for this purpose.

A simple and nevertheless exceedingly powerful drain-clearing device is Cooper's Patent Suction and Vacuum Pump (Stand No. 30), which pumps up any obstructive substance, and also clears away the accumulated coating from which the interior of a soil- or waste-pipe is seldom entirely free. The pump consists merely of a wooden handle to which is attached a solid rubber disc, pierced with a series of holes, on each side of which are lighter rubber flanges.

Apparatus for disinfecting sewer air has an example in Arnold's patent deodorising apparatus (Stand No. 27), arranged to bring automatically together two chemicals in a liquid state, which by their reaction generate gases, having a powerful disinfecting and deodorising action on the sewer gases as they ascend through the apparatus. The "two chemicals" are not specified, but can be easily guessed. The apparatus is adapted for use in all kinds of manholes, whether in sewers or house drainage systems.

Another automatic disinfector of a simple and useful kind, more particularly for domestic use, is Austin's porous disinfector (Stand No. 17), which is no more than a porous cylinder filled with crystals of permanganate of potash, this being gradually dissolved by the immersion of the cylinder in the water of a cistern or other tank.

Whilst speaking of disinfectants we may notice Odamine, shown by Odams' Manure and Chemical Company, Limited, a carbolic preparation which is well spoken of by Mr. Ernest Turner and others.

An invention, which recent winter experience will commend to many householders, is the apparatus of the Anti-Freezing Air Valve Company, which is intended to shut off the supply of water to the pipes without emptying the cistern.

Of baths there are but few in the exhibition, the most notable being the steel-clad copper bath shown by the Sanitary Bath Company, Limited (Stand No. 60), in which the copper is protected by steel externally and tin internally. A cheaper bath is the enamelled steel bath, of galvanised steel, enamelled inside.

Shanks & Co. (Stand No. 1) also show several good baths, in which the salient feature is an

accessible waste. The same firm have likewise a good thing in urinals, made in one piece of earthenware; and exhibit besides some good examples of closets of modern type.

In the department of heating, the Gurney Foundry Company, Limited, of Toronto, exhibit (Stand No. 187), some of their heaters and radiators, which are admirable examples of well-designed and highly-efficient apparatus for heating on the low-pressure system.

Messrs. G. Shrewsbury (Stand No. 63) shows some examples of hot-water apparatus, of small size, suited for conservatories, and heated by gas, a convenient and even luxurious, if somewhat extravagant, method. The same exhibitor also makes a feature of the "Calda" water-heater for baths.

Mr. T. Polterton shows an ingenious form of zig-zag boiler for use at the back of an ordinary kitchen range, which thus utilising some of the heat usually wasted, assists in warming a house throughout by a system of hot-water pipes to which it is connected.

Another device, which is, to a certain extent, an improvement on usual methods, is Bushell's patent water-heater, in which, instead of a boiler, steam-piping is coiled around the kitchen fire in a manner somewhat resembling that adopted in the high pressure system of hot-water heating.

Messrs. Grundy's well-known system of warm air heating is represented at Stand No. 185.

Messrs. Charles Erith & Co. (Stand No. 120 B) represent the Smith ventilating fan, one of the best, if not the best, axial fans on the market; and also show their system of combined heating and ventilating apparatus, which has, before now, been noticed in the columns of the *Builder*.

Messrs. Baird, Thompson, & Co., Ltd. (Stand No. 78) exhibit their well-known ventilating appliances, and the equally well-known Blackman fan is shown at Stand No. 213.

Mr. J. F. Simmance (Stand No. 18) has on show his improved mica flap-protected outlets and inlets for ventilating pipes, whether for drains or for larger shafts, which are simple and well-adapted to prevent down-draught.

Under the heading of general fitting and finishings there are several exhibits which merit our attention.

Taking, firstly, door and window-fastenings and fittings, we notice the exhibit of the National Accident Prevention Company, Limited, and in particular their patent reversible sashes, enabling the glass to be cleaned from the inside. This can either be done by top-pivoting or side-hanging, both involve splitting the stiles, and consequently this joint is important; this company have a check-joint along the stile which sufficiently answers the purpose.

The casements in wood and gun-metal, invented by the same company, are a great advance on the ordinary methods. By means of a vertical revolving rod, extending from top to bottom of the casement, the same window can be made to open inwards or outwards, at the will of the operator; the frame revolving on a gun-metal pin above and below. In the case of a wooden casement, the revolving rod fixed to the frame is depressed by the stile friction-plates, thus allowing the casement to pass freely either inwards or outwards, yet forming a perfect water or air check. In a metal casement, the hanging stile has a corrugated back, and works on a pivoted revolving corrugated rod, enclosed in a metal frame, allowing the casement to turn freely, a weather-proof joint being obtained by these corrugations. A water-bar projects over the upper and lower horizontal joint of the casement and frame. It is one of the most interesting and useful of the inventions.

Mr. E. G. Kendall's reversible window-sashes also admit, in a modified form, of the window being cleaned from the inside. Shurmer's patent sash and frame are also of this type, the sashes balancing each other without weights, the upper one can also be opened by itself as a casement sash at any inclination.

Whitley's patent windows, and those of the Simplex Window Fittings Company, Limited, are others on the same lines. In the latter the sash-fastener, instead of being on the meeting rails, is fixed at the side of the frame in a convenient position, and having a tall flush bolt. In this case also the top and bottom sash are dependent on each other, no sash-weights being used; the top sash can also be inclined inwards at any angle as a hospital casement.

All these inventions show a great advance on the ordinary sash-frame. The only thing which we would recommend to the attention of inventors in this direction is an invention to enable the glass of a double-hung sash to lie in one plane when the window is shut. The two planes of glass are always a disagreeable feature.

Coming to door-fittings, we notice especially Messrs. Kaye & Son's exhibit, in which good workmanship and material are evident. The "push and pull" locks are well-known to architects, but several new improvements are shown. Messrs. Kaye's automatic door porters are sunk in the floor and keep the door open, when necessary, by a rounded raised knob held in position by a spring. The patent automatic wedge-lock for the use of railway carriages, and which fasten the doors automatically by easy closing are an improvement. The panic or exit door-fittings for theatres, arranged to open by merely pressing against the door, have been adopted by the London County Council, and are in use at the Queen's Hall and elsewhere.

Comfort in a house largely depends on the satisfactory state of the locks and door furniture, and Messrs. Kaye have numerous contrivances for various forms of doors which we have not space to discuss here.

We turn to flooring, in which Messrs. Turpin have an excellent exhibit in designs of all kinds, applicable to parquet flooring, &c.; that for temporary use in ball rooms is of advantage. The wood-block floors by the same firm are laid in a bed of cement composition, and held in position by a projecting tongue and groove. The advantage of this system over the use of dowels may be fairly stated, in that the latter *can* be left out by negligent workmen. The Kauri Timber Company exhibit some specimens of this New Zealand wood which has a beautiful colour. No particulars as to price were forthcoming. but it has been used for paving with good results in England, and seems well adapted for all kinds of joinery and decorative fittings, being free from knots, of good colour, and straight grain.

The Linoleum Tile Covering Co. show their floor covering, in which the colours, instead of being on the surface only, are the same right through the thickness of the material, and consequently the linoleum shows no wear till the substance is worn right through—a decided improvement on the ordinary material.

Messrs. W. Garstin & Son's granito-plumbic paving consists in the introduction of lead in conjunction with several manufactured materials, such as granite siftings and Portland cement; the claim is that by its use steps can be permanently finished with a non-slippery surface. They have been used by the School Board for London. The principle, whether applied to granite, composition, or wood, consists of a number of holes bored in the front portion of the tread of each step, within $\frac{1}{4}$ in. of the riser, and these are then filled with lead.

Mr. W. Gooding exhibits his interchangeable rubber stair treads; they are useful for railway stations, and consisting of an iron, gun-metal, or brass frame, screwed on to the front portion of the step, and filled at close intervals by squares of indiarubber, which are noiseless, and easily refilled.

The Clifton artificial stone, by Messrs. Hobman & Co., is used in steps, and declared to be non-slippery. It is made in various designs and colours tending to marble imitation. As a material, no doubt, it is excellent, but we should prefer if it could express itself without imitating a natural material.

In the fireproof-floor section we note the interlocking flooring of Messrs. C. G. Picking & Co. It is a hollow tubular brick floor, each tube consisting of two cavities; the feature claimed is the large amount of hollow space compared with other systems, and the consequent smaller quantity of concrete filling used, and the greater resistance to the passage of sound. The blocks themselves will, it is stated, carry a safe load of 5 cwt. per foot super, without the aid of concrete. Messrs. Potter & Co. also exhibit their fireproof-floor, the steel joists are enclosed with burnt clay flange shields provided with air spaces, and stretching from each joint is a corrugated iron permanent centreing in an arched form, on which the concrete is laid. Variations for different classes of work are shown, and the inventors claim that the cost does not exceed that of ordinary flooring. Coming to roofing, we notice Messrs. W. Edgecumbe, Rendle, & Co.'s exhibit. Their invincible system of glazing, attached or not to a wooden sash bar, dispense with the use of putty, and water-channels and condensation-gutters are properly supplied. The roof-tiling exhibits are exceptionally good, both in workmanship and colour. Messrs. H. J. and C. Major, Limited, have a tastily-designed little pavilion into which their various manufactures are worked. We noticed especially their patent interlocking tiles, which are securely laid without nails or mortar, and are useful in exposed positions, the underside being provided with water checks for driving rain. These tiles of Somerset make are claimed to be lighter than Broseley tiles, and have a better weathering face.

Of fireproof partitions we notice especially Pease's system of interlocked tubing, consisting of thin metal sheeting bent to circular tubes of different sizes, and fitting into one another: these are then filled with concrete. The tubes can be either fitted together as partitions, or walls, or horizontally as flooring, forming a permanent centering for the concrete. It is useful for columns, in which later capacity they favourably impressed us for interior work, as they can be made of bronze or brass, and form a series of cylinders touching each other.

The use of silica cotton as a sound-proof material is well shown in Messrs. Fred Jones & Co.'s exhibit.

The Fireproof Construction Company exhibit their hygienic hollow-block fireproof partitions, 2 in. in thickness. They are composed of slabs about 5 ft. 6 in. long, 10 in. deep, and 2 in. thick. They are pierced in the direction of their length with hollow cylindrical spaces, and are held together by Z clamps fitted into a saw-cut. Being only 3 in. thick, with plaster finish, they should supersede the old 6 in. brick partition, as they are useful in confined spaces.

The Granite Silicon Plaster Co. exhibit their specialty, an artificial stone composition designed to supersede ordinary lime-plastering in interiors. Its properties are hardness, quickness of drying, and an almost polished surface; it is also non-absorbent. Internal plastering of our houses has undoubtedly not kept pace with the hygienic activity in connexion with other fittings, and it seems that in some such form we shall certainly find an advance on ordinary "render, float, and set" work.

There are few exhibits of improvements in paints. The Copal Varnish Co., however, are an exception. It is well known by architects that to produce a pure white-painted surface which will keep its colour white lead is not applicable, as in a short time it becomes yellow through taking up oxygen. To remedy this "Paris white Japan," consisting largely of zinc, has been produced, which, it is claimed, has properties of permanent whiteness. It is a small subject, but one which many architects are interested in.

In connexion with grates and fireplaces a few exhibits deserve attention. The patent self-setter range by Messrs. Yates, Haywood & Co. has been used in the artisans' buildings erected for the Guinness Trust. The chief point is the ease with which the flues are cleaned by removing the oven. The Quadrant kitchener, by the same firm, has a self-adjusting, lifting fire, which is raised or lowered by one hand, and over- and under-draught ovens can be made with enclosed iron flues.

Mr. James B. Petter exhibits the "Nautilus" grate; it is, in fact, a fire-brick-lined, slow combustion, portable dog-stove, for use in open fire places, in which the products of combustion rise and revolve within a volute-formed top, passing through into a flue leading into a chimney, the smoke being automatically consumed by being drawn over the incandescent fuel at the back. The grate is fitted on wheels, and thus easily removed in summer.

Cresswell's Patent Asbestos Curfew Curtain, a revolving fireproof curtain placed in a brass frame under the mantelpiece, is useful as a blower and for being pulled down at night to prevent the possibility of fire sparks setting light to the building.

In conclusion we would merely mention the beautiful turned balusters shown by the Clapton Steam Joinery Works; some of these are of good design, and the prices at which they can be produced is somewhat astonishing, and due entirely to improvements in this class of machinery.

In the department of electrical work, Messrs. Riley & Co. show specimens of the "interior conduit" or "tubular" system of wiring which has come into extensive use in the States. The advantage of this system will be appreciated by architects, who often find it difficult to deal with the ordinary wood casing in which the electric wires are placed. Very rarely is the casing-cover moulded to suit the decorations of the room. We have occasionally found it placed under the floor. This is objectionable electrically because of the danger of water upset on the floor entering the casing, or of nails through the floor touching the conductors. Rats, also, in old houses cause trouble by eating the insulation of the conductors.

Another bad practice is to put cables through holes in the wall and fill the space round with Portland cement, which, after a time spoils the insulation.

The tubular system gets over all these difficulties. The twin cables are put in a tube made of a kind of papier-maché thoroughly treated with bitumen. The tubing, which is waterproof, can be had covered with a layer of any kind of metal, either to protect the cables or to match existing fittings. The ends of the pieces of tubing are fitted with brass sockets, which can be jointed in less than a minute. Ordinary gasfitters' tools can be used advantageously in installing this new conduit.

In the States, where there are hundreds of miles of it in daily use, several—if not all—the insurance companies pass it. In Keith's New Theatre at Boston, which cost over 120,000*l.*, ten miles of brass armoured conduit have been used in the installation. We do not see why this new system of wiring should not have a great future, as it is safe and cheap, and, from the electrician's point of view, it has the great merit of giving ready access to the wires.

Amongst other electric exhibits, Callender's Bitumen, Telegraph and Waterproof Company, Limited, show samples of the Callender-Webber system of conduits for electric mains, and also of the Callender "solid" system. The great advantage of the former system is that if a sufficient number of ducts are formed at the beginning, no extra expense and trouble can be caused later on by having to open the streets to lay new mains. The latter system is of a very substantial character, and looks as if it would last indefinitely. It is in use at Liverpool and Bath. The joints are made in special boxes, samples of which are shown. The boxes have double walls, the space between them being filled with bitumen in order to prevent moisture getting in.

The Blackman Ventilating Co., Ltd., amongst other exhibits, show a continuous current motor and fan combined. It runs at 500 revolutions per minute, and displaces 3,000 cubic feet of air. Taking electricity at 6d. the unit, the cost of working would be under a penny an hour. They have already supplied the Houses of Parliament, and many smoking-rooms and business premises in the City, and claim that their alternating current motor fan gives every satisfaction, being self-starting, and requiring very little current.

Of decorative or artistic work there is not much which it is necessary to notice from that point of view. We may remark on what is rather a new feature in these exhibitions in the shape of a stand of drawings lent by the Institute of Architects—certain drawings of St. Peter's, St. Paul's, &c., which are pretty well known to the frequenters of 9, Conduit-street; and also an exhibit of the Corporation of London, consisting of a number of drawings of their principal buildings, models of the Council Room at the Guildhall, and of the Guildhall roof, and a small drawing, (dated 1865), showing Sir Horace Jones's idea for a Municipal Court and offices, forming a quadrangle in front of the Guildhall, with an arched opening into Cheapside.—Messrs. Minton's tile exhibit shows some tiles that are agreeable both in colour and design; we approve of the rather delicate tints employed.—Messrs. Webb & Co. show some good and rather original tiles. Mr. H. Herrmann exhibits some wood carved panels, the special point in which is that they are almost entirely cut by machinery, but finally finished by hand; thus getting some of the economy of machine labour, while avoiding its purely mechanical result. Some specimens should have been shown giving a panel as it came from the machine, so as to give a definite idea of the extent of hand-work in it, and of what the machine could accomplish.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS:

SOUND IN ITS RELATION TO BUILDINGS.

THE ordinary meeting of the Royal Institute of British Architects took place on Monday last, at 9, Conduit-street, Mr. James Brooks (Vice-President), in the chair.

Mr. W. H. White (Secretary), announced the decease of Mr. Ernest Turner, elected Associate in 1867, and Fellow in 1877; also of Mr. Hubert A. Gregg, elected Associate in 1887, son of Mr. Ebenezer Gregg, and a young man of great promise.

The Chairman announced that an intermediate examination to qualify for registration as Student, was held on the 19th, 20th, 21st and 22nd instant. Applications were received from seventy Probationers, including those relegated from previous examinations. Of these, fifty-six were admitted, and fifty-four presented themselves and were examined; twenty-eight passed the examinations, and twenty-six were relegated to their studies. The names of the successful students, placed on the paper in order of merit, were as follows:—

John Ormrod, Bolton; Ernest William Marshall, London; Thomas Anderson Moodie, Hillhead, Glasgow; Thomas Spiers Fraser, Glasgow; Ernest Jesse Mager, London; Tom Norman Dinwiddy, Greenwich; Victor Evans Bösher, St. Leonard's-on-Sea; Herbert Haines, Bedford; Frank Ward, Bradford; Louis Moore, Southampton; William Stanley Bates, Bedford; Percy Bown, Harrogate; James Henry Coram, London; William Alphonsus Scott, Drogheda, co. Louth; Alexander Godolphin Bond, B.A., Bristol; Wallace Stevens Jones, Bristol; Arthur James Ecclestone, Great Yarmouth; James Stockdale Harrison, Leicester; Hugh Alfred Ellis, Manchester; William Vincent Morgan, Carmarthen; Arthur Reutlinger Gough, Redland, Bristol; George Herbert Manning, Harlesden, N.W.; James Edward Coleman Shield, London; John Arthur Smith, London; Edward Hale, King's Norton, Birmingham; Stanley Edward Knott, East Barnet; George Westcott, Old Trafford, Manchester: Rupert Claud Austin, Cambridge.

Mr. H. W. Burrows then read a paper on "Sound in its Relation to Buildings," of which the following is an abstract:—

Mr. Burrows, in his opening remarks, said that without professing to put before the Institute any new views in the treatment of the complicated science of acoustics, he should endeavour to pass in review some of the principal later writings contained in scientific treatises and technical journals, dealing with the science entirely from an architect's point of view. The form which a building should assume to insure acoustical success was a question upon which much difference of opinion existed. Simplicity of plan was not of necessity good for acoustics, square rooms being often found to be defective. Most authorities condemned flat surfaces, as reflections took place in the right angles of such apartments, at the floor, walls, and ceilings. It had been found of advantage in such cases to cant off the angles of rooms, or to curve the ends, or to place the speaker near the corner of the room, so that he addressed the audience diagonally. Some writers considered that if rectangular rooms were adopted they were improved if one dimension was longer than the other. Sound-waves being propagated in spherical layers from their point of origin, curved forms had been recommended, but opinion was not unanimous on this point. Of buildings having a circular plan, St. Paul's was a well-known bad example; but this was mainly due to the close proximity of the speakers to the walls. Another effect would, no doubt, be produced if the speaker were situated in the centre of the circle or near it. Certain inconvenient acoustical effects met with in buildings of circular plan were not experienced in those where the walls were broken by a large number of deep embrasures. Polygonal buildings gave varied results. The Westminster Chapter-House, octagonal on plan, with central clustered columns and vaulted roof, was stated by some writers to be bad acoustically. On the other hand, the old Surrey Chapel, a sixteen-sided room, with a gallery and hemispherical roof with lantern light, had been quoted as a very successful building for its purpose. The Albert Hall, London, a building of the oval or ellipse type, had been almost universally condemned. Before it was built failure was predicted, as the reflections from such a form were known to be concentrated in the foci of the ellipse, and this, together with its vast size, form, and material of roofing, had combined to produce a great acoustic failure. The amphitheatrical type of plan had proved successful in many instances, but some notable exceptions, chiefly by reason of excessive sonorousness, were referred to. Other types of plan were those in which the end was more or less curved, and the sides produced somewhat after the plan of the basilica. The L.C.C. Council Chamber, an example of this method of planning, was considered to be an acoustic success. One writer proposed to terminate rectangular halls with a parabola, and give a parabolic form to the roof over the platform. It was objected, however, that all sound originating in the body of a hall might be concentrated in the focus of the parabola, so that great difficulties presented themselves in dealing with a curved surface of that nature. Among buildings planned as elongated rectangles with rounded ends which were successful acoustically was mentioned the Queen's Hall, Langham-place, a noticeable feature of which was the truncated, trumpet-shaped orchestra. The horse-shoe type of plan, largely adopted for theatres, had been attended with but varying success, depending much on the materials used in construction, and largely influenced by the boxes, which according to one writer were favourable to the laws of sound, and according to another monster traps for strangling it. Various examples were mentioned of what the author termed a composite type of plan, in which the walls at the rear of the speaker or orchestra were formed as a truncated pyramid, diverging outward, with the seats arranged in a semicircular or other curve. In churches and cathedrals, the avenue type of plan had been criticised because the columns which carried the arcades caused sound shadows, and were therefore objectionable. A reverend writer had attributed the acoustic excellence of Magdalen Chapel to the T-shaped plan—choir and transepts, without a nave and without aisles. The same writer considered that with a T-shaped church, the choir separated from the transepts by a light screen, and the organ placed behind a reredos at the extreme east end, an ideal result æsthetically and acoustically would be obtained. With regard to the influence the *section* of structures had on the propagation of sound, most writers agreed that smooth surfaces reflected sound, while broken or rough surfaces dispersed or absorbed it, so that in some instances it might be found advisable to break up the ceilings with rafters, or to form recesses or projections in the walls. A chief consideration in this connexion was the size of the room. As to the form of ceiling, various conflicting opinions were quoted and examples cited, it being generally agreed that right-angle junctions between walls and ceilings were bad, as confusing reflections resulted, to obviate which some form of cove had been usually adopted. The difficulties presented by concave curves were shown by the failure acoustically of most domes or cupolas, due usually, it had been said, to the powerful and prolonged resonance produced. To prevent the loss of sound upward it was probably best to keep ceilings moderately low, consistent with good proportion. With regard to the dimensions of a building, what was known as Harmonic Proportion was strongly urged by many. For good acoustic properties, it had been maintained that a building should be so constructed that its different dimensions should be in some simple relation to each other; this was illustrated by a well-known analogous effect in music. A list of successful buildings showing the value of harmonic proportion was quoted by the author from a paper by Mr. A. F. Oakey, who mentioned that in one case he had cured the acoustic defects of a room by the introduction of some shelving on which books and periodicals were stored. Concerning the influence of construction and materials on the acoustic properties of buildings, the greatest possible differences existed both among architects and scientists. The varying requirements of buildings partly accounted for these divergent views. Where resonance was demanded, the most elastic materials were needed, while in others less elastic substances might suffice. The results of a series of interesting experiments with wood, slate, tile, and plaster, recorded by Mr. Fletcher Barrett, and some valuable observations by Mr. Oakey on the choice of materials, were here referred to, followed by a summary of the recommendations of the Congress of Architects and Engineers which met in Italy in 1880, when the question of the employment of wood in theatre construction was discussed especially in relation to acoustic effects. Advocates of a more solid type of construction and material had spoken well of concrete for floors of concert-rooms and lecture-halls, buildings constructed of fireproof material, of iron and concrete, having been pronounced to be wonderfully resonant. Fibrous plaster had also been adopted with success; but the most reliable material to produce a satisfactory resonance when required was undoubtedly wood, and that by preference fir. In treating of heating and ventilation and their effect on sound, the author dealt with the experiments and researches of Professor Tyndall and others on the subject of the acoustic properties of the atmosphere, and described in detail the results of an elaborate series of experiments carried out by Mr. W. W. Jacques, which went far to show the extreme importance of good ventilation in regard to the acoustic qualities of buildings. A series of tests at the Baltimore Academy of Music had proved

that the almost perfect acoustic properties of that building were largely due to the condition of the air, and not to the plan, or to the materials of which the building was constructed. The direction of the ventilation was of little or no moment, for it had been demonstrated that sound was heard, not only with the wind, but often much better against it, and, better still, across it. The principal office of ventilation in its acoustic bearings seemed to be that it rendered the air free from those acoustic clouds which disturbed, diverted, modified, or absorbed sound-waves, as atmospheric clouds modified or destroyed light. The key-note of rooms was next considered. A recent writer had pointed out that a hall built of masonry had a different note from one constructed of timber, or largely composed of that material. Another, speaking of the sensitiveness of the old Salle de Concert at Paris, asserted that the wood lining of the hall had become, like an old violin, well seasoned and tuned to respond readily to the vibrations of both voices and instruments. With regard to the various remedies suggested to improve acoustic defects, cushions, furniture, &c., as was well known, deadened sound, and thick draperies on walls prevented or greatly modified echoes. At St. Paul's Church, Boston, it was stated, the preacher could only be heard when the church was decorated. A beneficial effect had resulted from the presence of an audience, the addition of shelves filled with books and papers, the use of a *velarium*, flags and such like hangings, venetian shutters, sounding-boards, &c. The use of wires and cords had been recommended, and at times stated to be successful. In conclusion the author referred to the bygone use of acoustic vases. Mr. St. John Hope had questioned the theory that they were inserted with a view to augment the sound of music. Considerable resemblance seems to exist, however, between some of the acoustic vases and the resonators devised by Professor Helmholtz. Any volume of air contained in an open vessel, if caused to vibrate, yielded a certain note, and when that note was sounded in its neighbourhood it tended to strengthen it. It was much to be regretted that so many of these acoustic vases had been either removed or destroyed, as the opportunity had been, to a great extent, lost of testing their value or otherwise for acoustic purposes.

Professor Roger Smith, in opening the discussion, thought they must be very much indebted to the writer of the paper for having gone into the subject so thoroughly, and having produced such a large series of facts and statements. To his mind the most interesting part of the paper was that dealing with the condition of the atmosphere in rooms. A good many other points had been more or less raised before, but this he believed was a comparatively new point. There could hardly be a doubt that, unless the condition of the atmosphere in a building was homogeneous, there must be some difficulty in the radiation of the sound. This suggested rather a new idea, as to the possibility of improving hearing in theatres and places of the sort, and the necessity of preserving the atmosphere at a tolerably uniform temperature. If this could be carried out, it would be an exceedingly interesting result. To a certain extent, every building was an experiment, and it would be well if the Science Committee of the Institute, under whose auspices this paper had been read, could secure a collection of observations upon interiors, their dimensions and materials; whether they were successful for music and for speaking, for the two things were very different; and if they were not successful for either one or the other, whether they were uniformly bad, or bad in one place and good in another. Such observations, if tabulated with regard to a considerable number of known buildings, and by careful observers, would doubtless throw a little light upon what was undoubtedly a very obscure subject when one came to apply it. Mr. Burrows had quoted the opinion of one gentleman, who considered that Her Majesty's Theatre was bad for sound; but that he considered was a mistake, for it seemed to him that music had never sounded as it did there. He was not sure, too, whether the Albert Hall deserved quite to be called a failure. A building where six or seven thousand people could hear music successfully, could hardly be called a failure. There was, no doubt, a considerable amount of echo, but in the early stages of that Hall, when it was full of timber scaffolding, it promised to be a wonderful place for sound. When this mass of timber was taken down, the echo from the roof was found to be great. His own impression was that the echo did not come from the glass of the roof but from the large cove. With regard to another elliptical building where an echo was found, he had an opportunity of tracing the actual lines which sounds from a certain point would make, if they went up to the cove and were reflected down. He found that they followed a certain line, forming almost a ring on the floor, and occupying that portion of the floor where there was difficulty in hearing. Therefore, no doubt the echoes which, notwithstanding the introduction of the *velarium*, were to some extent still heard in the Albert Hall were due more to the cove than to the glass of the ceiling. Mr. Burrows had not said quite as much about echo as it deserved, and he (the speaker) would rather like to say a few words about echoes in rooms. Such experience as he had had in endeavouring to unravel the defects of rooms where there was a difficulty in hearing, led him to believe that, of the two things — excessive resonance and echo—the latter was the more troublesome of the two. The place where the greatest difficulty in hearing was experienced was where there were bare flat walls, against which the speaker's voice could impinge, and where the sound was reflected level to the ears of some of the audience. Mr. Burrows had referred to one of the lecture theatres of University College. At that college there were two theatres, one being above the other, but in the lower one the echo was more distinct. This was formerly a very good room for hearing, the sloping seats being high, and covering up the walls. The authorities of the college, however, thought it desirable, for reasons connected with safety in case of fire, to alter the room, and give it a flatter slope, so that since then it had been infested by an audible echo. His impression was that a less distance than 55 ft. quoted was quite sufficient for the purpose, and he had formed an opinion that if the difference between the direct path of the sounds from the speaker to the hearer, and the length of the reflected path—supposing it was reflected from the wall—if the difference was more than 40 ft. an interference from echo was perceptible, and when it became a little more than 40 ft. it was very perceptible. Consequently, in a room not more than 20 ft. across a man might hear the echo of his own voice. The presence of flat, bare surfaces made good reflectors, and the putting of columns in front of them was one of the best means for insuring freedom from echo. Resonance was a thing it was very difficult to deal with. There was no doubt that up to a certain point resonance was an advantage, and where music was only to be considered an extraordinary amount of resonance could be enjoyed. In such a place as Westminster Abbey or Canterbury Cathedral a wonderful amount of resonance in the atmosphere was a striking feature, for if a chord were sung by the choir, after the voices had ceased, one might hear it, as it were, resounding up above for several seconds. No doubt it required a very skilled speaker or reader to speak or read in a church of that sort, without disturbing the resonance. At the same time, a very large number of persons could hear very distinctly in Westminster Abbey, and it was certain that a great amount of resonance could be tolerated, especially if the person speaking or reading knew how to manage and modulate his voice. He concluded by proposing a hearty vote of thanks to Mr. Burrows for his excellent paper.

Mr. Tavenor Perry remarked that he had had occasion to build a house on a very exposed part of the coast, and he built it almost entirely of concrete, filled in between brick sections. A year afterwards he asked the proprietor if he were satisfied with it, and was told that the only thing which troubled him was resonance, and especially in a gale. From that he learned a lesson, and two or three years afterwards, when he had to build the Alhambra Theatre, he constructed it of concrete, the result being eminently successful.

Mr. H. H. Statham, in seconding the vote of thanks, confessed that he had not studied the subject from the scientific point of view of acoustics, but he was rather consoled by the reflection that all those who had differed from each other. He merely desired to make some remarks on observations made by himself during a great many years as to the effect of public buildings in regard to music. He would confine himself to that, because it was the point to which he had given special attention. In the first place he would say that he quite agreed with the opinion quoted in the paper, to the effect that a building might be very good for speaking, and yet extremely bad for music. A building which might be good for one person standing at a particular point, might be quite unsatisfactory for a number of persons to be heard together. There was a good deal of confusion of idea in regard to resonance. He was well acquainted with one building which produced very strong echoes, viz., St. George's Hall, Liverpool, and which was entirely composed of hard materials with granite columns and cement walls. A wooden floor had been put down, but still all the walls were composed of hard materials. The echo, when the organ was being played, was tremendous, and the eminent organist there one day remarked to him that the Hall no doubt "helped the organ very much," meaning that it helped the tone: there was a grand roll after a chord was struck. But what might be called the design of musical composition was another thing, for in that case echo was not wanted. In St. George's Hall, as in the cathedrals, there was a grand effect on striking a chord, but in playing one of Bach's fugues there was a muddle from the echo. So that when some people were carried away with a desire for resonant effect, they were spoiling the effect of complicated music. A hall which was very much upholstered would prevent an echo, and such a room would be good for clearness of effect in connexion with instrumental music. The complaint made by singers, however, was that it did not help the voice. In another hall which was exceedingly upholstered, there was no echo, but one felt that the singer wanted some help. He thought the Albert Hall a very good building for sound, considering its great size. He understood that the echo there was very bad before the *velarium* was put up, and no doubt the curve of the roof with its glass and iron was simply a reflector to focus the sound down. Since the *velarium* had been put up the echo was much less than might have been anticipated in so large a building; but it was impossible to get rid of echo when a hall was so large that sound took an appreciable interval to travel along it and back. Then, again, it was the wrong shape. It was a general rule in connexion with all halls for music, that the audience should face the performers. The trumpet-shaped orchestra of Queen's Hall had practically proved a success, for having attended the Philharmonic Concerts in St. James's Hall for many years, he found that in the Queen's Hall, which held about one-third more people, he could hear quite as well. Reference had been made to Dr. Parker's Temple, and he could bear testimony as to its being a good room for music, from his observations at an organ recital given there, and the clearness of definition with which rapid pedal passages were heard. It might, therefore, be well to find out the reasons for that. It was no doubt true that by arranging rooms according to certain harmonic proportions they could be made to respond to a certain note. But they came back to the old difficulty of what was good for a single voice and what was good for an orchestra. It was very convenient for a public speaker to find that, by pitching his voice to a certain note, he could make himself heard; but in the case of music they were not kept to one note, and nothing was more annoying than listening to music—and it occurred especially with the organ—and finding one particular tone of the instrument strongly reinforced by the room. He had heard that over and over again in cathedrals, and so far from it being an advantage, it was in reality a nuisance. So that the plan of a building, in regard to getting a particular note, could only be successful where it was wanted for public speakers alone—music demanding so much more. As to materials for the walls of buildings, it appeared to him that wood and fibrous plaster were the best for reinforcing and helping the sound. His experience had been that all substances which reflected light sharply reflected sound sharply; so that in lining a room they should look to those substances which would help the sound without reflecting it back again, these being wood and fibrous plaster, and especially a hollow lining of wood. The paper was a useful one, as bringing together a great many things and experiences; and it might suggest further experiments and operations.

Professor Aitchison remarked that Mr. Burrows had referred to the opinion of the Astronomer-Royal as to the Whispering Gallery at St. Paul's, and he should not like to give a strong opinion on such a subject against so eminent an authority. But precisely the same effect was to be met with in what was called a square at Leeds, where there was a 10 ft. wall with a garden, and which was divided into four quadrants by four streets. If any-

one stood at one of the angles and whispered, a person at the opposite angle could hear distinctly, although perhaps not so strongly as at St. Paul's. He, therefore, thought the dome could only have a little to do with it, and it must be mainly owing to the curvature of the walls. Sir Christopher Wren, who had a great deal of experience in arranging all sorts of buildings, and places particularly for hearing purposes, gave as his opinion that 50 ft. in front of a speaker, 30 ft. on each side, and 20 ft. behind him, were very convenient distances for hearing. When he was quite young to the profession, he remembered an alteration being made at Exeter Hall, to make it more convenient for music. There were large lanterns, and it was doubly columned. Musicians were of opinion these might be done away with, and an architect of some eminence was called in, who proposed that a segmental ceiling should be put in. This was done, but he could not tell the effect of it, though it was generally believed by musical people to be a great improvement. He recollected an axiom about echoes, which was, that if any room was made in the shape of a double cube, there was sure to be an echo. When in Italy he remembered visiting a church in the Romagna, in the nave of which there were twenty-one echoes. Each arcade, he believed, was square, a double cube in shape, and with a dome at the top. He had never heard much speaking in such a place as a chapter-house, with a central column, but there was one example his hearers were more familiar with, and that was a dining-room with a ventilating gas-burner in it. He had noticed frequently that in the case of persons who sat at the two ends of the table, especially if they lifted up their heads when speaking, it was almost impossible for a person at the other end to hear what was said. Mr. Burrows had referred to amphitheatres, of which there were a great number, but he was not aware that they were much used for speaking in. They were all familiar with the "Morituri te salutant" of the gladiators, but that appeared to have been the only speaking that took place in an amphitheatre, except the jokes bandied from the lower part of the hearers to the Emperor. The speaking theatre was a semicircle, and amongst the Greeks rather more than a semicircle. At the back of it there was the wall scena. Almost all the remarks that had been made as to materials were contained in Vitruvius's account of the theatre and of the vases. Vitruvius considered that, in the case of theatres fitted with wood, there was no occasion for anything else, on account of the resonance, but when the theatres were built of stone or cased with marble, it was necessary to put up these vases for reinforcing the sound. These vases had been repeatedly referred to at the meetings of the Institute, and in books, as if they were put in only for ornament or amusement. That seemed to him, however, impossible, for the most distinct account was given as to where the vases were to be, and the exact tone to which they were to be attuned, and that, when the theatre was large, there were to be three rows of them. In various parts of the world these vases had been found *in situ*. It seemed, therefore, absurd to suppose that persons so acute as the Greeks and Romans would have had such things if they had been of no use. When they considered that there were thousands of people who appeared to adore music in England, it would be worth their while to subscribe sufficient money to get these vases, and see what the effect would be, in enabling large bodies of persons to hear when music was being performed. As far as he could make out, the theatres of the Ancients were used for what would now be called operatic performances. Most of them were acquainted with the plays of Terence, in which it was stated that the music was composed by a certain person, and performed on double flutes, to the right and left hand. The clerical critic to whom reference has been made seemed to think that architecture was as easy as composing sermons. He (the speaker) presumed that in the old times most of the service was chanted, and he could only hope that the experiments that gentlemen proposed might be tried. If they were not successful, he would then see that it was not so easy to make a place answer the purpose most perfectly for music and for sound. They knew very little about acoustics at present. It was impossible to say that anything more or less like another thing would have the same effect. As the architect did not desire to make each church the exact copy of another, the effect of its acoustic excellence might be different, although mainly founded on another form which had answered the purpose.

Mr. W. White, F.S.A., was satisfied that the chief element was the proportion of the building within the walls. In connexion with the building of many churches, he had carried out an invariable system, and he could claim only one failure, which was not on account of the proportions of the building, but from the intervention of a lantern in the centre. There seemed to be a general agreement that the proportion of the interior should be according to some harmonic ratio. This should not be a ratio of numerical or progressive proportion, but a ratio of absolute geometry. In that geometry the angles of 30, 60, and 120 were used in proportioning the distance from wall to wall, and from ceiling to floor. The proportions of 3, 4, and 5 had a definite relation to geometrical form, 3 and 4 being the two sides of the parallelogram, and 5 being the diagonal. Mr. White here exhibited several drawings, illustrative of his theory, one being of the Manchester Free Hall, the proportions of which were said to be 2, 3, and 5, that being an excellent room for sound. The proportions of the Massachusetts Hall were 3, 4, and 5, and the London University was very nearly the same, but not quite. The worst proportion for a room was a perfect cube. He remembered the case of one 25 ft. square and 25 ft. high, which was most intolerable for sound. The proportion mentioned by Dr. Brewer, viz., that a room should be two-thirds more than its breadth, was nearly the same as the proportions he had submitted. But he most of all wished to insist upon the fact of the actual coincidence of proportion of the equilateral triangle with the number of vibrations in a second forming certain notes of music in harmony with each other.

Professor Banister Fletcher thought it would be well if the subject were referred to the Science Committee with a view to the tabulation of information on that point.

Mr. Brydon wished to have some information as to the diagrams on the walls?

Mr. Langton Cole said he was the son of the architect of the Stock Exchange, the acoustic properties of which had always been a difficulty. To the three classes of buildings which Mr. Burrows had mentioned, a fourth should be added, namely, the building where a large number of persons all wanted to speak at the same time, and yet wished that there should be no noise. That meant that they wished to get rid of resonance, which was very mixed up with echo. If the Science Committee could help him to get rid of the echo in the Stock Exchange he would be ready to offer them every opportunity for experiment; of course, after business hours. He would like to ask Mr. Burrows whether he considered marble a resonant material or not? They had hung up flags round the piers of the dome, which answered well, but they were asked to take them down, because they gave the Stock Exchange the appearance of a charity bazaar.

Mr. Emerson (Hon. Sec.) thought if the last speaker would remove the alabaster and then remove the walls they would hear well on the Stock Exchange. The conclusion he had come to, from the study of domical buildings in India, was that those of which the walls came immediately under the dome square on plan, or with shallow recessed transepts, echoed more than any other buildings in the world. In buildings where the domes were supported on columns only, like some of the large domes in India, with a series of vistas from either side of considerable length, there was not nearly the same amount of echo. Domes were commonly stated to be bad for sound, and he believed it had arisen from the fact that they were almost always built over walls which nearly enclosed the space underneath, so that the sound could not get away. In Florence Cathedral there was not much echo, because there were large open spaces in proportion to the space covered by the dome, so that the sound got away.

The vote of thanks was then put, and was very cordially received.

Mr. Burrows said that, as a member of the Science Committee, he would be pleased if they could carry out Professor Roger Smith's suggestion, to collect as much information as they could of materials, construction, and ventilation, with the view of putting the results in a somewhat tangible form. As to the differences of material, they all went to show the enormous divergence of opinion which existed between observers. One said resonance was the right thing, and another said not, but as Mr. Statham had well put it, the main point was the consideration of the use to which the building would be put. The Stock Exchange had two *velaria*, one immediately under the dome, and another in segments between each of the windows lighting the dome. There were also festooned draperies in the spandrels of the arches, and they had packed the floors with slag wool, yet all these things were unsuccessful. At the opening of the Stock Exchange, when an orchestra performed in it, the building was said to be exceedingly good for sound; but when it was used for speaking, the reflection of the sound came rapidly from the walls, and was bothering to everybody. If the marble was taken off, and wood used in its place, and if a ceiling was built up instead of the beautiful dome, it might possibly be a successful building. The convex cove, used at Langham-place, was the reverse of the concave cove, and had been well illustrated in the *Builder*. Mr. White's contribution was an important one, confirming from his own practice the value of an approach to harmonic proportion. They should have some agreement, first, as to what they had to look for, and should divide the buildings into classes, studying the lines which should be applicable to each particular class.

The Chairman announced that the next meeting would take place on Monday, April 22, when the Art Committee had arranged for the reading of papers on "Marble," by Professor Aitchison and Mr. Wm. Young.

The proceedings then terminated.

COMPETITIONS.

PUBLIC LIBRARY, PERTH.—On the 19th inst., at a private meeting of the Perth Town Council, Mr. Washington Browne, architect, Edinburgh, gave his decision on the competitive plans lodged for the Sandeman Free Library. He placed plan No. 7 first, and bracketted two other plans, Nos. 1 and 5, equal second, the premium being divided. On the Town Clerk opening the sealed envelopes it was found that the winners were Messrs. Campbell Douglas & Morrison, architects, Glasgow, and that Messrs. Brown & Watt, Aberdeen, and Mr. A. G. Heiton, Perth, were bracketted equal second. On the motion of Bailie Young, seconded by the Lord Provost, the meeting awarded Mr. Washington Browne a hearty vote of thanks for his lucid and interesting statement, and for the care he had taken in advising the Council. The estimated expense of the building is 9,998*l.* without the picture gallery, and 1,470*l.* additional if it is erected.

PONTYPRIDD PUBLIC DRINKING FOUNTAIN.—The first premium in this competition has been awarded to Mr. C. B. Fowler, of Cardiff. There were close on thirty designs sent in. The fountain is to cost about 250*l.* The design is of a bold Early character, filled in with ancient British ornament, such as may be found at Llantwit, Margam, Llandough, and several places in the county. The structure stands 16 ft. high.

ARCHITECTURAL SOCIETIES.

YORK ARCHITECTURAL SOCIETY.—On the 21st inst. a lecture entitled "A Visit to Norway," was delivered by Mr. Norman R. Yeomans, in the Grand Saloon of the Corporation Art Gallery, under the auspices of the York Architectural Society. A number of the prize drawings of the Royal Institute of British Architects were on view in the saloon. Mr. Yeomans, by means of a large number of lantern views, conducted his audience through the various places of interest in Western Norway, from Stavanger to Trondjhem, the principal part of the journey being performed by steamer along the numerous fjords, and the land journeys by means of the curious conveyances of the country. The cathedrals of Stavanger and Trondjhem, together with the architecture of the towns visited, were fully described, and special reference was made to the old Stavekirke or wooden parish churches—those apparently semi-Asiatic buildings of which so many fine examples happily still exist.

CARPENTERS' HALL LECTURES.—The last Wednesday's lecture was given by Sir Leader Williams, on the Manchester Ship Canal, and will be reported in our next issue. The lecture for next Wednesday will be given by Mr. W. R. Lethaby (see our "Meetings" column), in place of Mr. H. H. Statham, who has been unable, on account of press of work, to prepare the lecture which he was announced to give on that evening.

STUDENT'S COLUMN.—Owing to pressure on our space, we are obliged to defer this week's chapter of "Bricks and Terra-cotta" to another issue.

Illustrations.

BUDAPEST OPERA HOUSE.

THE new National Opera House at Budapest takes a good place among the leading opera houses and theatres of the Continent, though the area covered by the block is by no means so extensive as might be expected in a country where national patriotism so often induces the people to blindly compete with larger and richer capitals.

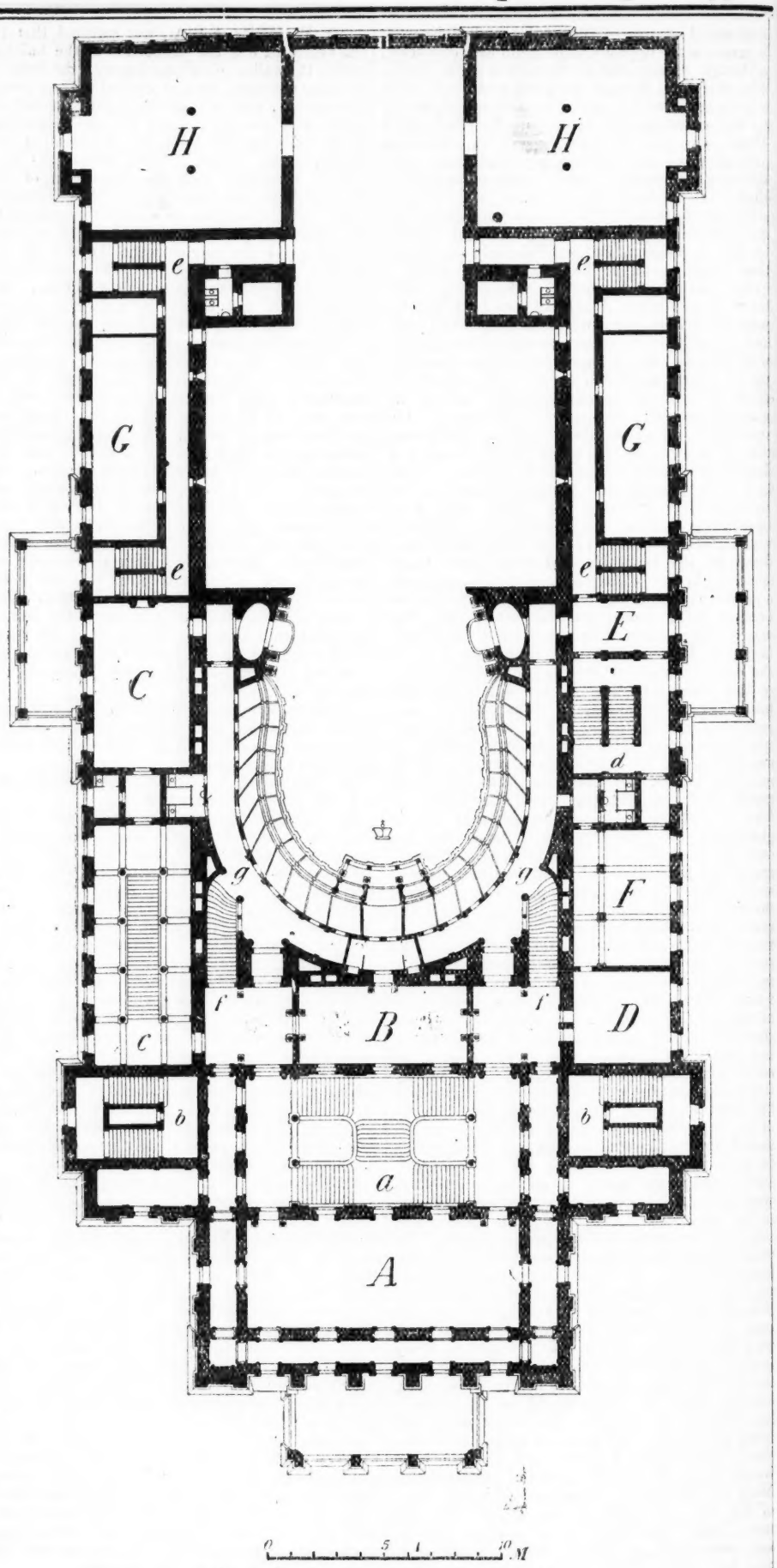
The National Opera House stands on a site facing the Grand Radial Avenue, which is second only to the Champs Elysées at Paris. Though the site has public thoroughfares on either side and at the back, these are, unfortunately, only about 60 ft. wide, and the effect of the building is by no means so good as it might have been on a more open site. The cramped position is said to be due to the financial difficulties which threatened to prevent the erection of the building in 1873, when the proposals were first made. At that time the Austrian Emperor, as King of Hungary, had notified his intention of presenting the nation with the structure, and the Municipality of Budapest made a gift of some 40,000*l.* for the necessary site. Though contributions from other sources were offered to cover the cost of a more suitable plot, they could not be accepted for various reasons, and this situation was finally determined on as the best avilable.

The history of the building commenced in 1873, Two years were spent in preliminaries, including a limited competition for the design, in which six architects took part. Each candidate received a fee of 200*l.*, and the winner was promised the commission besides a premium of about 1,500*l.* The late Freiherr von Ibyl was the successful architect, and the foundation-stone of the building was laid in 1857. But slow progress was at first made owing to a dearth of funds, and after the carcass was complete, there was some revision of the design in 1882, owing to the Ring Theatre fire. The building was eventually opened with much ceremony in September, 1884. It would be well to remember that the plans were prepared previous to the great theatre fires at Boston, Nice, and Vienna.

Though built as a national monument, and owned and administered by a Government Department, the Budapest Opera is managed on strictly commercial lines, so that the number of boxes reserved for Royalty and the Government and the number of official free seats is reduced to a minimum. The building is open to all comers on payment of admission. The King has his suite of reception-rooms, and some boxes at his disposal, and these he certainly makes use of; but the whole building is only reserved for his guests on very rare occasions, when the visit to the Opera would be a State function of great importance. The seating accommodation in the auditorium is too luxurious, and is comparatively small, and the heating, ventilation, and lighting is of the most expensive kind. In judging the plans it must be remembered that the building was designed as a national monument, with but little attention to economical working. No National or Court Opera House, planned as such, however economically managed, has hitherto been able to work without a subsidy; where the subsidy is to be avoided, the architect must know this at the outset and design accordingly.

One of our illustrations shows a plan of the Opera House at the level of the first tier and grand foyer. As will be seen, the grand staircase has a central position between foyer and auditorium, and the auditorium corridor is divided into "right" and "left" by the state box with its ante-room. The staircase always has to be passed to reach the foyer end. Owners of boxes on the "right" of the auditorium have a circuitous route through the foyer if they wish to visit owners of the box on the "left." On one side of the auditorium extensive accommodation is devoted to the reception-room and staircase to the King's private box; whilst on the other side the space has been given to the staircase and ante-room of the administration, and to an extensive practice-room. On either side of the grand staircase, staircases lead to the third tier, and these, it will be seen, have no connexion with the first tier. Separate entrances, vestibules, and lounges are provided for the third tier, which is arranged as a gallery, with rows of seats. The second tier, which really only consists of a few boxes, has two small connecting staircases from the first tier.

The floor of the grand foyer is about 9 mètres above street-level. The grand staircase, which is



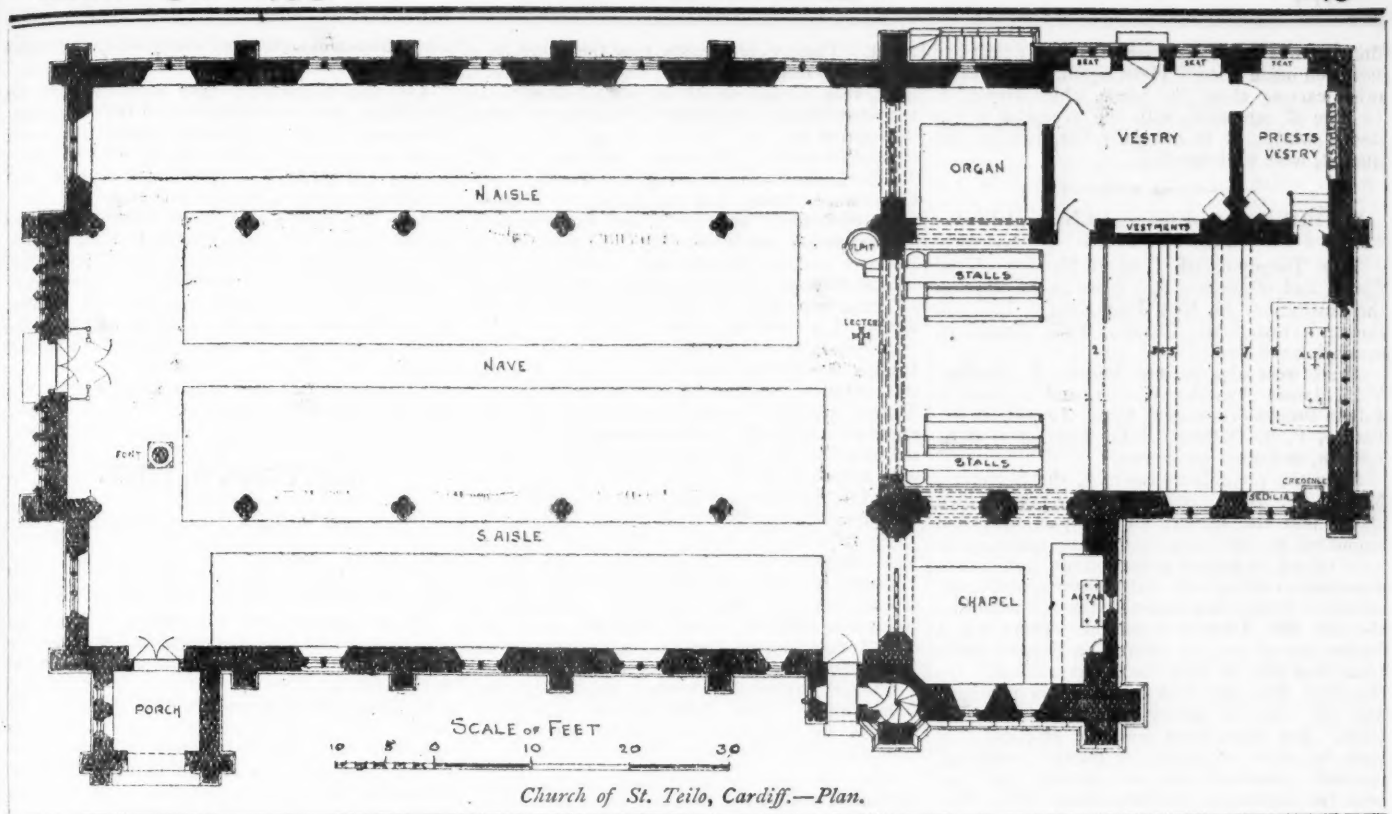
Plan of National Opera House, Budapest.

A Grand Foyer.
B Ante-Room to Royal Box.
C Royal Reception Room.
D Refreshment.
a Grand Staircase.
b Staircase to Third Tier.
c Royal Staircase.
d Administration Staircase.
E Manager's Room.
F Practice Room.
G Dressing Rooms.
H Stores.
e Dressing Room Staircase.
f Staircase to Second Tier.
g Staircase to Dress Circle.

the main approach to this tier, has its own spacious vestibule raised a few steps above the pavement level. A *porte-cochère*, with three doors, affords ample protection for patrons arriving by carriage; there are two side doors for foot passengers, leading into the same vestibule.

Great care has again been taken to avoid all draughts by a good system of double doors, outer lobbies, or porches. The grand staircase is so planned that the first flight leads to the level of the dress-circle, from which there are also approaches to the stalls. The dress-circle is divided up into boxes. Extensive cloak-room accommodation has been provided for the stalls.

The third tier staircases each have spacious vestibules adapted for forming "queue," without inconvenience from weather. The vestibules to the royal staircase, and the staircase of the



Church of St. Teilo, Cardiff.—Plan.

administration, are carefully planned, and have their own separate *porte-cochères*.

In the auditorium the division of seats is of some interest. There are only 428 seats in the floor of the house, and 477 in the third tier, and there are altogether 65 boxes with 362 seats. This means a total seating accommodation of 1,267, which is certainly very small, and can only be accounted for by the unusually luxurious dimensions of the seats and gangways The building cost 3,200,000 florins, or over 250,000*l*, so that the relation between the seating accommodation and the cost is interesting.

The great feature of the Budapest Opera House is its mechanical contrivances. The hydraulic stage (built according to the "Asphaleia" system), the warming, ventilating, and lighting of the building, have all had great attention given them, and lastly also the fire-extinquishing appliances, which include extensive systems of sprinklers. We cannot here enter into the technical details of the various elaborate appliances of which the building can boast, many of these are of an experimental nature, and are being constantly modified or altered. The "Asphaleia" stage has not been found as perfect for practical working as its promoters anticipated, nor has it been found economical. As the first example of its class, perfection could of course not be expected, but at the same time some serious mistakes were also made in its design. Of appliances which are certainly valuable we may mention the sprinklers over the stage, which are very well arranged. A trial of these appliances put it beyond doubt that, if the upper part of the stage was not overcrowded with canvas, no fire could live under their torrent of water for five minutes. To ensure their efficiency, however, the sprinklers must be kept in good order, the water supply must be always available, and the necessary officials who are to attend to the levers must be at their posts. A trial, however conscientiously carried out, does not ensure the reliability of a sprinkler in case of need, nor prove the advisability of the great expenditure they occasion. Taking it for granted there are no mishaps or hindrances, the sprinkler can be of great service, if arranged as at Budapest, but the usual hydrants should on no account be omitted. Such mistakes must not be made as at Warsaw and elsewhere, where the great divisional curtain has been omitted on account of their introduction.

The material employed in the façades is a national freestone. The interior by no means shows the over-decoration frequently found in Continental playhouses. The general style is a somewhat severe Italian Renaissance, and the colouring rich but dark in tone. The woodwork is in a dark oak, and the drapery coverings in a dark red velvet. The staircase and reception-rooms of the King alone show a more brilliant system of decoration.

EASTWELL PARK, ASHFORD, KENT.

THE extensive additions and alterations at Eastwell Park for the Right Hon. Lord Gerard were completed last autumn. The old mansion has been practically rebuilt, and a new wing added, with billiard-room, &c., on the ground floor, and bed-rooms over; also a large winter garden, conservatory, and plant-houses, entirely new stabling for forty horses, horticultural buildings, lodges, new water and drainage systems, electric light installation, formation of new gardens, lawns, lake, &c.

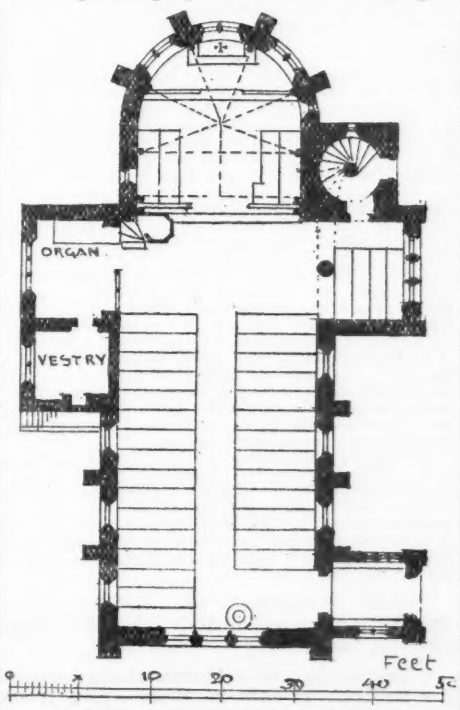
The architect was Mr. William Wallace, of London, and the principal contractors were Messrs. Holland & Hannen for the general building operations; Messrs. Gillow for painting, &c.; Messrs. Mackenzie & Moncur for conservatories and horticultural buildings; Messrs. Smith & Co. for iron roof of winter garden; Messrs. Stuart & Co. for granolithic paving, &c.; Messrs. Kavanagh for earth work.

The view shows the north front of the house. The drawing was exhibited at the Royal Academy last year.

ST. JOHN'S CHURCH, BASSENTHWAITE LAKE.

THIS church was built a few years since, mainly at the expense of Mr. John Boustead, late of Armathwaite Hall, near Cockermouth.

It is picturesquely situated under the wing of



St. John's Church, Bassenthwaite.—Plan.

Mount Skiddaw, an outlying spur of which is shown in the accompanying view.

The building externally is faced with Fauld's Brow light grey limestone from Caldbeck Hills, the dressings are of light-coloured freestone from Howrigg quarries. Internally, the walls are finished with broad tooled Shaulk freestone; dressings tooled of similar stone, the reredos round chancel and apse being of a red quality of Shaulk stone, there being no plaster work in the church.

The internal woodwork is in oak, the nave roof being a "wagon-head," and the chancel vaulted and groined in oak.

The slating is of Green Buttermere (Cumberland).

The sitting accommodation is for about 220.

The architect is Mr. D. Brade, and the drawing was exhibited at the Royal Academy of last year.

CHURCH OF ST. TEILO, CARDIFF.

THIS church is intended to meet the requirements of the Cathays district of the large and thickly-populated parish of St. Andrew's.

The site on which the church is being erected was the gift of Mrs. Mackintosh of Mackintosh, who has also largely contributed towards the building fund.

The walls are of stone, with box-ground Bath-stone dressings. The roof-timbers are of pitch-pine left free from stain or varnish. The church accommodates 812 adults. The contractors are Messrs. Shepton & Sons, of Cardiff, who are carrying out the work from the designs and under the superintendence of Mr. G. E. Halliday, Architect and Diocesan Surveyor for Llandaff.

ANCIENT CARVED NEWELS AT ARGELÈS, HAUTES PYRENÉES.

ARGELÈS DE BIGORRE (for that is the full name of the place) is a charmingly-situated village on the line from Lourdes to Pierrefitte in the Lavedan Valley, in the Department of the Hautes Pyrenées, and about nine miles from Lourdes.

The carved newels, of which three are illustrated, are a feature in the place, an expression of local taste and talent. Those marked No. 1 and No. 3, in two different houses, are probably of the same date and by the same hand, from their general resemblance in design. In the house where No. 1 is found there was no other carving at all, either on the staircase or about the house, and this is very often the case, all the ornament being given to the newel; but in No. 3 the ornament was carried throughout the staircase, for there were carved panels half way up each flight of stairs and on the landings, and at the turn of the stairs; the position of one panel and the turning are just hinted at in the drawing. No. 2 is a much more ancient example, and was found in a cottage in the old part of the town; it is a very bold piece of work cut out of the solid oak, but unfortunately the top has been broken; the owner on seeing the

drawing was rather distressed that this defect had not been made good. Here, again, there was no other carving about the house, which seemed to be bare of ornament, with the exception of the doors, which, as is generally the case in this district, were well panelled.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

THE Twenty-eighth General Meeting of the donors and subscribers took place at the offices of the Institution, 21, New Bridge-street, E.C., on the 26th inst., Mr. Charles Wall, President, occupying the chair.

There were also present Messrs. T. Stirling, V.P., James Aynesley (Carter and Aynesley), Edwin Brooks (Treasurer), C. K. Turpin, H. W. Parker, F. S. Oldham, B. G. Thompson, J. A. Robson, and other gentlemen.

After the preliminary business, the Secretary, Mr. H. J. Wheatley, read the report, which stated that the income for the past year had amounted to 808*l.*, the total being made up of 227*l.* 6s. 6d. in annual subscriptions, 326*l.* 1s. in donations, 128*l.* 4s. 3d. in dividends, and 125*l.* moiety of legacy bequeathed to the Institution by the late Mr. Thomas Robinson. There was a further sum of 10s. 2d. interest on deposit, and a balance of 18s. 1d. from the dinner account. On the other side, 340*l.* had been paid in pensions, and 36*l.* 10s. in sundry grants for temporary relief. For some years past the elections had been by show of hands at general meetings, specially convened for the purpose, but last year two contested elections were held—Mrs. K. S. Hill, Mrs. M. Smith, and Mrs. S. A. Bennett having been the successful candidates for the pension—and Thirza M. Smith and Kate C. Hill for the orphan benefits, the latter consisting of admission to the Orphan Working School by presentations owned by the Builders' Clerks' Benevolent Institution. The total number of pensioners on the books, including those above-named, was nineteen, and three children were in the school. The annual dinner was held at the Holborn Restaurant (Mr. Wm. Shepherd presiding) on April 17 last, the appeal made by him on the occasion resulting in the sum of 330*l.* being announced in aid of the funds. During the year a purchase of 450*l.* stock had been made, bringing up the total to 5,000*l.* The Committee expressed their thanks to Mr. W. Shepherd for his valuable services as President during the past year. Mr. Charles Wall had consented to accept office as President for the present year.

The Chairman, in moving the adoption of the report, said that, looking at the figures furnished to him, he noticed that their income had grown, and the amount expended had also grown, showing that much good had been done for clerks and their widows.

Mr. T. Stirling, in seconding, said he was an old associate of the charity. He quite agreed to the importance of business habits, and as an auditor he knew the work was well done. The Institution had been of much use, and he believed its use would continue.

The report was then unanimously adopted.

Mr. Wm. Shepherd and the other retiring officers were thanked for their services. Mr. Stirling, in acknowledging the vote of thanks, observed that although Mr. Shepherd had retired from the Presidency, he had not retired, he felt sure, in the way of giving up the interest he had taken in the Institution already, which he hoped would be continued.

New officers were then elected, including Mr. Charles Wall, of Chelsea, as President, and Messrs. Joseph Randall, Wm. Shepherd, and Charles Ansell as arbitrators.

A vote of thanks was then presented to the President for his services in the chair, and the meeting closed.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday, in the County Hall, Spring Gardens, Mr. Arthur Arnold, Chairman, presiding.

Jobbing Works Schedules.—The General Purposes Committee reported that the Works Committee had forwarded to them a schedule of net prices for hoarding and shoring works, which prices have been agreed to by the valuer, the architect, and the manager of works, and approved by the Works Committee. The prices are the same as those charged under the last contract entered into for similar work before such work was done by the Works Department. There only remains now the schedule of prices in connexion with engineering works. This, they hoped, would be settled shortly. A recommendation approving of the course taken was agreed to.

Appointment of Sanitary Inspectors.—The Public Control Committee reported that the Local Government Board had sanctioned the appointment of Messrs. May, Hills, and Gathercole as sanitary inspectors in the City of London, at the salary of 200*l.* per annum each. One-half of the salaries of these officers is payable by the Council, in accordance with the provisions of the Public Health (London) Act, 1891.

Progress of the Blackwall Tunnel.—The Bridges Committee presented a report detailing the operations in connexion with the Blackwall Tunnel, in which it was stated that if the open approaches to the Tunnel be considered as finished out of a total of 6,200 ft., a length of 4,100 ft. was executed at the end of February. With regard to the cast-iron-lined part of the Tunnel, considered by itself, out of a total distance of 3,083 ft. a length of 1,410 ft. was completed. The estimated cost of the work done up to February 28 was 487,378*l.*, of which 9,724*l.* represented the value of work executed in connexion with the raised approach road, and 4,935*l.* was due to the progress made during February.

London Building Act, 1894, Part XI.—Low-lying Lands.—The Building Act Committee brought up the following report, the recommendations being agreed to:—

"On 5th June last, the Council, on the recommendation of the Main Drainage Committee, made, with the concurrence of the Tribunal of Appeal constituted under the General Powers Act, 1893, certain regulations with regard to building on low-lying land. Appeals in respect of this matter as well as of all others in relation to the construction of buildings and so forth, having, under the London Building Act, 1894, to come before the new Tribunal of Appeal appointed under that Act, it is necessary as a matter of form to make the regulations under the new Act. We accordingly recommend—

(*a*) 'That the Council do, under section 123 of the London Building Act, 1894, make, with the concurrence of the Tribunal of Appeal constituted under section 175 of the Act, the following regulations prescribing the course to be followed by applicants for permission to erect or adapt dwelling-houses on low-lying land—Every person who shall be desirous of erecting or adapting any building to be used wholly or in part as a dwelling-house on any land in the county of London of which the surface is below the level of Trinity high-water mark, and which is so situated as not to admit of being drained by gravitation into an existing sewer of the Council, shall first make a written application for a licence. Such application shall be addressed to the clerk of the Council. Such application shall contain a statement as to the nature and extent of the interest of the applicant in the building or buildings proposed to be erected or adapted, and be accompanied by a plan and section of the lowest floor of such building or buildings and the curtilages thereof, to a scale of $\frac{1}{8}$th of an inch to a foot, and by a block plan to a scale of not less than $\frac{1}{1056}$ (which may be on a sheet or sheets of the Ordnance Survey, or may be drawn on tracing linen), showing the position of such building or buildings and the local sewer into which it is proposed to drain such building or buildings, and the connexion of such local sewer with an existing sewer of the Council. Such plans and sections shall be accompanied by a description of the materials to be used in the construction of such building or buildings, and shall be coloured in accordance therewith. The points of the compass shall be marked on the block plan. The position and course of the drainage system proposed to be adopted for the disposal of sewage and rain water, and its connexion with the local sewer or an existing sewer of the Council, shall be clearly shown on the plans and sections, and the diameter and inclination of the drain-pipes shall be figured thereon. The plan and section shall also indicate in figures the level above or below ordnance datum at which it is proposed to construct the floor of the lowest rooms. The decision given by the Chief Engineer of the Council upon such application shall be reported to the Building Act Committee, and the Committee shall report it to the Council, and thereupon, if it is to the effect that the erection or adaptation may not be permitted, the Clerk of the Council shall by letter inform the applicant that the Council, acting upon the decision of the Engineer, has refused permission. If it is to the effect that the erection or adaptation may be permitted, a licence under the seal of the Council embodying the conditions of the Engineer's decision shall be issued to the applicant.

(*b*) That the Council do make the following regulation under Section 122 of the Act—It shall not be lawful to place the under side of the lowest floor of any permitted building at such a level as will render it liable to flooding, and every permitted building shall be efficiently and properly drained, to the satisfaction of the Engineer for the time being of the Council, either into a local sewer or into a main sewer of the Council.'"

London Improvements and "Betterment."—Mr. Westacott moved, and Sir J. Blundell Maple seconded the following resolution:—

"That the question of the removal of the obstructive buildings in front of Bozier's-court, at the corner of Tottenham-court-road and Oxford-street, which cause a great interference with the traffic, be referred to the Improvements Committee, and that they be instructed to report to the Council as to the advisableness of such improvement being undertaken and carried out by the Council."

Mr. Beachcroft said that to show that the Moderate party were prepared to take a reasonable view on the "betterment" question, he would mention that in his opinion about a third of the cost of that particular improvement could be and should be recovered by such a charge.

Mr. Whitmore, though he hoped the new Council would not adopt the old Council's policy of hanging up all improvements until it secured the particular form of "betterment" approved by the majority, nevertheless opposed the motion, because he was not in favour of dealing with the question of improvements in such a piecemeal fashion.

At seven o'clock the debate stood adjourned; and the Council then rose.

Correspondence.

To the Editor of THE BUILDER.

CARDIFF, SOUTH WALES, AND MONMOUTHSHIRE ARCHITECTS' SOCIETY.

SIR,—Your version of this matter, as "very unprofessional and very discreditable" in respect to some members of this Society, is perfectly fair and well justified.

If Mr. E. M. B. Vaughan, its President, were better advised, he would long ago have given over the futile and "thankless task" of whitewashing, in order to engage in some efficient withdrawal from the impossible position into which the Society has been rushed. This would be a "vindication" of the right kind, doing justice to a number of estimable local architects who view with much concern a Society drifting into grave difficulties through the conduct of a minority which has, by a class of energy fortunately infrequent in professional affairs, obtained the true mastery of the ship.

In writing to you, Mr. Vaughan takes upon himself to speak for the Cardiff Corporation and their obligations, legal or otherwise, towards me. I therefore state that there is absolutely no basis entitling him to thus prejudge the matter, and he already knows enough of the facts to have prevented his doing that.

I want the upshot of this case to be a help towards defining what an allied society of the Royal Institute of British Architects may, or may not, creditably be made to do by organised interference with the well-recognised practice of a member: and what class of influences they may call into play upon that sometimes variable quantity known as "the mind" of public bodies.

Mr. Vaughan was some time ago urged in very emphatic terms to place his view of the case before the Institute, and well-known architects have written to me with a similar suggestion. If his cause is good, why does he hesitate? As ex-President I certainly have not had any hesitation thereon.

Such a clear A B C of professional right and courtesy could soon be pronounced on at headquarters, and the best evidence of necessity for such pronouncement is this:—that on my making at length an unmistakable stand against a series of unprofessional acts, Mr. Vaughan does not recognise therein anything of better calibre than "bad judgment and ill-feeling in forcing this matter before the public notice." This quoted sentence has a queer ring about it, in face of the fact that the first notification of any proposal of the Society to memorialise for my work appeared in the press even before their meeting, and that immediately after the memorial was drawn up, its text was again prominently published with my own name specially introduced in a manner which has seriously prejudiced me. Then again, Mr. Vaughan's professional discernment limits him to seeing "nothing whatever which can be construed as dishonourable or reflecting discredit upon the Society," in the chief phrase of that remarkable memorial to the Museum Committee, viz.:—"That unless they have *already pledged themselves* to any architect, they should invite, &c." Considering that I won the building (which included the Cardiff Museum and Art Gallery) in well-contested competition in 1880: that I was commissioned and did prepare plans, details, specifications, and quantities, and obtain tenders for extensions thereto in 1890; that those extension-plans were after two years abandoned partly because I myself helped to show good reasons therefor: that without intermission since 1880, I alone have acted continuously as architect for the Museum and Art Gallery; that these facts were

perfectly well known to these local architects: considering all these things, with very many others for which I cannot ask for space here, then the architects' very *naïve* suggestion to the Committee respecting "pledging" seems to contain something more forcible than the harmlessness of the dove. For it does two things; it first betrays their knowledge respecting another architect, and it next opens the minds of the Museum Committee to the high importance of "pledging," in case they are *only* honourably bound and not pledged to me. Truly, "there be amendings which do magnify the first-done fault."

As I have shown, this matter was "forced" before the public by the Society, or more probably by one of its energetic votaries, for even the Hon. Secretary (as he courteously wrote me) did not know of the "memorial" meeting having been summoned, and would have objected had he known it! Then, again, an important reason why this extraordinary memorial was sent to the Museum Committee was publicly stated by the President to be that the agent of the landowner, from whom the new museum site was purchased, was present (as an architect-member of the Society) at the said meeting, and that he told the other architects that one of the conditions of the taking called for a competition. This statement, when questioned by myself (for I had been acting officially in respect to the agreement), was afterwards contradicted, and the gentleman said to have made it also wrote to me to say he did not make it.

And, with such contradiction, down went the one shaky prop which had been exhibited as a sufficient justification for the Society's conduct! Immediately thereupon, the "efficient withdrawal from an impossible position" should have been taken in hand, and I should then not have needed to trouble you with this letter. But no; the Memorial still remains as a threat to me, unjustified by any single action of mine towards either the Architects' Society or the Museum during the years I have been concerned with both.

Nor have I taken any precipitate action. This instance of public interference is by no means the only one I have suffered from recently, though it is the first time it has been organised; but, being then first President of the Society, and desirous of avoiding contention, I took no defined action.

When the present case arose (five days after my vacating the presidential chair), certain attendant circumstances disclosed to me what was on hand (together with the various agencies relied on for success), and I wrote at once to the president that I had legal claims on the museum as architect, which would be upheld, and declining to enter into discussion with anyone but my clients upon a business matter which was in my hands. I also wrote to the Secretary, before the meeting, courteously protesting against interference, but that letter was not read to the members. Then, when in spite of all I had urged, the memorial was rushed through, a large number of names was attached to it of members not present, or knowing nothing of its contents, certain of whom afterwards strongly objected to the memorial altogether.

This peculiar method being disclosed when the document was duly presented (but deferred), I expected during three weeks after to see some reforming step taken. It did not come, and I at length wrote to the President expressing regrets at being unable to attend the annual dinner, taking that opportunity of letting him know, with some candour, my opinion of the members' treatment of me.

I did not expect him to announce or even touch upon that latter portion at the dinner, but I afterwards found myself, as ex-President, ignored decisively, and my letter again suppressed, though other letters of apology were referred to in the usual way. Such an incident not only roused public interest, after the previous public announcements by the Society of its doings respecting me and my work, but it went far to declare that the local Society is not the body for me to appeal to further.

Your own editorial comments were a fair and right reflection of these circumstances, and though Mr. Vaughan's letter to you has made this fuller statement requisite, I shall avoid further debate unless my complaint of bad treatment is either admitted, or shown to be groundless by an acceptable authority quite other than the Cardiff Society or a "memorialist" member of the same.

EDWIN SEWARD.

Cardiff, March 25, 1895.

WAVERLEY STATION HOTEL COMPETITION.

SIR,—I observe that you have published a letter from Dr. Rowand Anderson with reference to the Waverley Station Hotel Competition, and have also commented thereon in your issue of March 23. I think it would be only fair to the Railway Company that you should publish the Secretary's reply to the above letter, and which apparently Dr. Anderson has withheld when sending you the letter.

You will be good enough to contradict the statement that I am the engineer to the Railway Company, which is entirely untrue.

I shall be pleased by your publishing the selected designs, and also those of Dr. Rowand Anderson, so that the profession and the public may be able to form their own judgments.

W. HAMILTON BEATTIE.

Edinburgh, March 25, 1895.

*** The intimation that Mr. Beattie was engineer to the North British Railway Company was made under a misapprehension on our part. It is however admitted that he has acted a good deal professionally for the Railway Company. The Secretary's letter in answer to Dr. Rowand Anderson we have seen a copy of, but it contains merely the usual assertions in such cases—that the directors chose what they considered the best design, &c. We are not throwing any blame on Mr. Beattie; but the whole story leaves the impression that he was intended to have the work all along, and that the competition was a foregone conclusion. It is manifestly impossible that the real merits of six elaborate sets of drawings for so large a building could have been gone into at one sitting.—ED.

CONFERENCE ON TECHNICAL TRAINING.

SIR,—My attention has been directed to the report in your issue of the 16th inst., *re* the Conference on Technical Training of Workmen in the London Building Trades.

In the said report I am made to state that my Society had approached the "Central Association of Master Plasterers," whereas what I did state was that our society had approached the Central Association of Master Builders.

You will greatly oblige by correcting this mistake, as there is no such body as the Central Association of Master Plasterers.

GEORGE COLE,
Dis. Secretary, N.A.O.P.

*** There appears to be something very like it, however, from the following letter.—ED.

THE PLASTERING TRADE.

SIR,—As Secretary to the Master Plasterers' Association of London, may I be permitted to reply, through your columns, to the remarks made by Mr. G. Cole, of the National Association of Operative Plasterers, at the meeting convened by the Architectural Association to consider the question of the technical training of workmen in the building trades.

While acknowledging the total failure of the Unions to induce their members to attend the technical classes opened at Great Titchfield-street, although every effort has been made by the promoters to render them attractive (even to the extent of providing the necessary tools for students), he went on to state that the men who at present carried out the bulk of the plastering work of London "had no regard whatever as to how the work was done," and "had no standing in his trade."

This I beg to flatly contradict. Either Mr. Cole had no knowledge of what he was discussing or wilfully perverted the facts. The master plasterers of London, as a body, are second to none in the building trade in their desire to improve the practice of the craft, and indeed it is solely owing to them that plastering still maintains its position in the list of trades.

It is they alone who have accepted and taught such apprentices as have of late years entered the trade through that (the sole legitimate) channel. I should say that it would be almost impossible to find a youth who had been apprenticed as a plasterer to a builder, or who, having been so apprenticed, had obtained anything like an adequate knowledge of his trade. The principal objection among builders to taking apprentices to any particular branch is simply that they cannot themselves adequately supervise the instruction of a youth, but must necessarily turn him over to a foreman or manager, who, having no personal interest in teaching him, simply looks upon him as a nuisance, or just allows him to go his own way, and pick up his trade as best he may, while the men among whom he works are, as a rule, by no means eager to help him, lest, in the fulness of time, he may displace themselves. Moreover, the builders have no certainty of regular employment for apprenticed plasterers.

With the master plasterer the case is different. In the first place he is a specialist, and necessarily himself a practical man. He must give a close, personal supervision to his work, and is in immediate and constant touch with his men. He deals, as a rule, with every phase of his trade, both in the shop and in the building; has an intimate knowledge of the material in which he works, and must be able to correctly read drawings and measure work, and, above all things, must have a full and sufficient knowledge of the value of work—a matter of which the average mechanic has but the remotest idea.

If it were not invidious to mention names I could immediately call to mind a score of men of standing and substance in London, who fully answer to this description, who have or might take apprentices to the advantage of the youths themselves, and the trade generally, who would have every opportunity of making themselves masters of their craft.

But against this the Plasterers Union have been doing their best by, in the first place, endeavouring to drive out the master-craftsmen altogether, and in the second, by endeavouring, as far as their power extends, to resist the entrance of lads into the trade, by making rules to enforce the payment of full wages to young men who could in no sense be regarded as competent mechanics, although, perhaps, of full age.

They have, it is true, a rule as to improvers, but in practice will not allow a young man to work with their members unless he is paid the standard rate.

Their inconsistency is shown by the fact that while they boycott the Master Plasterers who supply both labour and material, they allow their own members to take task work, labour only, a fruitful source of scamping and sweating—these men being wholly dependent for their profit on cheating the builders, or grinding the faces of their men, their prices being invariably below those of the employer, who has business premises to maintain and a staff of clerks and foreman to pay.

I am old-fashioned enough to believe that the demand will create the supply, and that quite provincial firms will continue, so far as their opportunities allow, to educate young men in the trade, who, attracted by the higher rate of wages, will drift up to London and fill the places rendered vacant by the purblind action of union officials, whose first and last care is to maintain their hold on their members, and whose anxiety for the welfare of the trade as a whole may in the majority of cases be judged of by their action in this particular case.

March 20, 1895. SAMUEL WRIGHT.

THE PURIFICATION OF SEWAGE BY MICRO-ORGANISMS.

SIR,—In your note upon my system of sewage purification by micro-organisms there is a suggestion that a "cultivation" filter-bed "may prove favourable to the development of some pathogenic organisms," and in answer to the question, Does the system ensure the destruction of all pathogenic bacilli? you say that upon this point the evidence is far from clear, and that Dr. Sims Woodhead's statement is very guarded. I trust you will kindly afford me an opportunity of pointing out that there is a great difference between a "cultivation" tank being favourable to the development of pathogenic germs, and its being capable in every case of "ensuring the destruction of all pathogenic bacilli." If Dr. Sims Woodhead had the slightest fear that the "cultivation" tanks would develop pathogenic bacilli, I am quite certain he would never have "spoken favourably" of the system, but his good opinion of it is quite consistent with his being guarded as to the certainty of its "ensuring the destruction of all pathogenic bacilli" which is a very different matter. There is room, in our present state of knowledge, for doubting whether or not certain pathogenic organisms could run the gauntlet of vast armies of hardier and harmless forms under the conditions supplied in a "cultivation" tank, but the fact that the typhoid bacillus dies out rapidly in an ordinary sewer where it meets similar enemies makes it exceedingly unlikely that they could escape.

Providing conditions most unfavourable to the survival of pathogenic forms is surely a step in the right direction.

Of course, the whole subject is at present open to argument. If certain of the organisms which are most active and beneficient in their work of breaking down effete organic matter are injected into the circulation of mice and guinea-pigs, they produce more or less specific trouble according to the dose, but even if the sewage were sterilised, I would be very sorry to have it injected into my circulation. Ordinary garden soil would provide material for an equally dangerous experiment.

The fact remains that Nature does carry on her work of purification by organisms that are for all practical purposes harmless, and the "cultivation" of these organisms provides conditions which are most unfavourable to the development of pathogenic forms.

I am somewhat vexed that you should have referred to the success of the installation at Towcester, because by an extraordinary coincidence it ceased to be perfect from the moment I asked to be paid for it. I would rather you had mentioned the much larger installation now successfully working at Boulogne.

W. D. SCOTT-MONCRIEFF.

SEWAGE PRECIPITATION.

SIR,—In response to Mr. Tarte's inquiry, published in last Saturday's *Builder*, I beg to say that when in Derbyshire last spring I found that several of the townships had adopted the Ives' system—I believe that is the correct name—for purifying town sewage by means of precipitation. I heard it spoken

of in the very highest terms by some of the Borough Engineers, and I may mention that I know it has proved singularly successful in Tamworth, Ilkeston, and Alfreton.

If Mr. Tarte were to write to the Borough Engineers of those towns, I have no doubt they would satisfy him of the accuracy of my statement.

JOHN EDWARDS.

LECTURES FOR "OLDER PRACTITIONERS."

SIR,—The Note in your issue of March 16, on the arrangements made in Berlin for lectures on technical subjects to "Older Practitioners," is well worthy of the attention of those of us who began life a little too soon to have the advantages of the scientific instruction which is now so lavishly offered on all sides—and at our expense—to our juniors.

It would be greatly to the advantage of men who "carry on their work on the lines of twenty or thirty years ago," but who yet are not too old to learn, to have opportunities of bringing their knowledge up to the standard which obtains in the present day, and of studying the much more developed and accurate methods of dealing with problems of design and construction, which scientific enquiry and research have made available.

The *savoir faire* of the organisers of the Berlin lectures for older men, in keeping their lectures out of the way of the schoolboy type of student, may be commended to the notice of the authorities of our University Colleges in London and elsewhere.

"AN OLD PRACTITIONER."

OBITUARY.

MR. F. G. WIDNELL.—We regret to hear of the death of Mr. Frederick Grainger Widnell, the well-known building surveyor, senior partner in the late firm of Widnell & Trollope, of Parliament-street, Westminster. Mr. Widnell, who received his professional training in the office of Mr. W. J. Gardiner, held for many years the appointment of Surveyor to the Admiralty. He was engaged in the preparation of quantities for some of the largest buildings in London, and in connexion with the fortification works erected under Lord Palmerston's Defence Act. Mr. Widnell's loss will be deplored by his many professional brethren, and by others who appreciated his high character, and were accustomed to resort to him for advice. Mr. Widnell was for more than twenty years a Fellow of the Surveyors' Institution, and was associated on several occasions with one of its most important executive committees. Mr. Widnell's funeral took place on Monday last at East Sheen, where he formerly resided, and where some of his family are buried.

MR. CHARLES R. GRIBBLE.—We regret to record the death of Mr. Charles Risdon Gribble, at his residence, 31, Montague-place, Russell-square, W.C., on Tuesday last. Mr. Gribble had for some years past, and up to the time of his decease, held the appointment of architect to the National Provincial Bank of England, Limited, during which period he carried out several important alterations at their head office, and at the Birmingham, Bristol, and Cardiff branches. Mr. Gribble also erected for them new banks at Newport (Mon.), Hampstead, York, Landport, Boston, Barry Dock, Warrington, West Hartlepool, &c., and also several sub-branches for the Birmingham and Bristol branches. The extensive works in alterations forming the London Agency of the Deutsche Bank, and the new branch of Messrs. Lambtons' bank at Sunderland, were also carried out by Mr. Gribble.

MR. ERNEST TURNER.—Mr. Ernest Turner, F.R.I.B.A., whose death we referred to last week, was Chairman of Council of the Sanitary Institute, and an Associé Etranger Société Française d'Hygiène. He was the third son of the late William Hall Turner, F.R.C.S., L.S.A., and was born in 1844, being educated at King's College School, London. He was afterwards articled to his cousin, the late Arthur Newman, architect, of Southwark, and was subsequently for some years assistant to Mr. Bulwer, architect and County Surveyor, Maidstone, and afterwards commenced practice in London. He early turned his attention to practical sanitation and hygienic construction, and at the time of his death was one of the leading sanitarians of the day. He was for twenty years a member of the council of the Sanitary Institute, and was almost from the foundation one of the judges of the exhibitions held in connexion with the annual congresses of the same body, as well as an examiner in sanitary science, and at the Royal Institute of British Architects. He designed and carried out the Rotherhithe Sick Asylum, Hospital at Teheran, Persia, and the Central London Throat and Ear Hospital. He was also consulting architect to the Hospital for Epilepsy and Paralysis, and Devon and Exeter Hospital proposed extensions. Mr. Turner also designed and carried out the three large laundries at Battersea, Kilburn, and Penge. He also redrained many houses and institutions in London as well as country mansions. Among his architectural works may be mentioned Christ Church Schools, Gipsy Hill; Parochial Schools, Herne Bay; house at Palace Court; Wimpole-street; Gipsy Hill; country houses at Totland Bay, Ascot, Sevenoaks, &c. The deceased was secretary to the Section "Architecture in relation to Hygiene" of the International Congress of Hygiene and Demography, and the success of this section was largely due to his labours. Mr. Turner contributed many papers at various times on sanitary matters, and he also wrote a work entitled "Hints to Househunters and Householders." His opinion was always greatly valued, as he possessed considerable business qualifications and much common-sense. He had a very large circle of friends, by whom his unexpected death will have been a great regret.

GENERAL BUILDING NEWS.

PROPOSED REMODELLING OF THE BRIGHTON TOWN HALL.—Definite proposals were made to the Brighton Town Council on the 21st inst. relative to a scheme that has intermittently engaged their attention for the past twelve years, namely:—(1) The construction on the site of the present Market and Corporation property adjoining new Police Courts and Offices, accommodation for the Police Fire Brigade, and a Fruit and Flower Market; and (2) the alteration of the Town Hall, including the rearrangement of all the Offices, the enlargement of the Council Chamber, and the provision of suitable Committee-rooms, ante-rooms, and other conveniences. Detailed contract drawings and specifications have been prepared, the estimated cost being as follows:—Retail Fruit and Flower Market, 6,500*l.*; New Police Courts and Offices, 24,000*l.*; Fire Brigade Station, 2,500*l.*; alterations to Town Hall, 20 500*l.* The recommendations made by the General Purposes Committee were that the Works Committee should at once advertise for tenders for the erection of the new Fruit and Flower Market only, and for the erection of the Police Courts and Offices and the Fire Brigade Station at such dates as they may deem advisable, having regard to the necessity of first completing the Market. They also recommended that the contract drawings and specifications for the alteration of the Town Hall should be approved, and that the Works Committee should advertise for tenders for the performance of the work at such times as they may consider will be most convenient. An amendment to refer the question back to the Committee was carried by 21 votes to 20.

WESLEYAN SCHOOLS, LEEDS.—The foundation-stones of a new Sunday-school in connexion with the Richmond Hill Wesleyan Chapel, Leeds, were laid on the 23rd inst. Mr. G. F. Danby, of Leeds, is the architect of the new building. The premises will consist of a central hall or assembly-room, 64 ft. by 35 ft., capable of seating 450 persons, with a recessed platform at one end. It will be lighted by two large mullioned windows at the front, and dormer windows at the sides. Over the platform will be an ornamental circular window, filled in with tinted leaded lights. The room will have an open timber roof, 24 ft. high in the centre. Separate entrances for the boys and girls will be provided with tiled lobbies and glazed screens. Abutting on both sides of the assembly-room will be class-rooms. There will also be a ladies' sewing-room or church parlour, 30 ft by 21 ft., with lavatory, &c. In the basement will be an infants' class-room, 30 ft. by 21 ft., with raised gallery at one end, and another class-room, 34 ft. by 21 ft. The whole of the internal woodwork is to be of pitch-pine varnished. The cost of the building, including boundary-walls, will be 2,800*l.* The works are to be carried out by Mr. C. Myers (brick and stone work), Mr. T. Harrod (wood work), Mr. T. Barrand (plumbing), Mr. Pennington (plastering), Messrs. Pickles Brothers (slating), and Messrs. Holmes & Co. (heating).

PRESBYTERIAN CHURCH, HAMILTON, LANARKSHIRE.—On the 23rd inst., the memorial stone was laid of Avon-street United Presbyterian Church, Hamilton. The new structure is to replace the present church, which was erected in 1779. The church has been erected from plans by Mr. J. B. Wilson, architect, Glasgow. The contractors are:—Mason, R. Downie, Hamilton; wright, J. C. Burns & Co., Larkhall; slater and plasterer, James Currie, Hamilton; plumber, W. P. Mitchell; painter, S. Kemp, jun., Hamilton; glaziers, M'Culloch & Co.; wrought iron, M'Callum & Hope, Glasgow; heating, Boyd & Sons, Paisley.

THORNLIEBANK PUBLIC SCHOOL, NEAR GLASGOW.—The Eastwood School Board having resolved to rebuild the school which was destroyed by fire last month, instructed Mr. William G. Rowan, architect, Glasgow, to prepare a plan. Mr. Rowan has just submitted his plan, and it has been approved by the Board.

CATHOLIC CHURCH, FELLING-ON-TYNE.—There has just been opened by the Bishop of Liverpool, in the absence of the Bishop of Hexham and Newcastle, a new Catholic church at Felling-on-Tyne. The church, inclusive of galleries in west end and transepts, seats 1,000, and being on an inclined site, has basement story under one half; it is built of Windy Nook stone. The electric light fittings, dynamo, accumulators, and gas-engine are by R. Barnett & Co., Newcastle. The high altar and reredos, in Caen stone, is by Mr. Milburn, sculptor, York; the altar and transept rails, of Caen stone and marble, by Pyle, of Newcastle; paving to aisles, sanctuary, &c., of marble terrazzo, by Ebner, of London; heating apparatus, by Metcalf, of Preston, Lancs; three stained-glass windows in sanctuary apse, by Atkinson Bros., of Newcastle. All the remaining work, inclusive of wood-block flooring, lead-glazing, &c., was by Mr. Joseph Howe, of West Hartlepool, contractor. The architect was Mr. C. Walker, of Newcastle.

SANITARY AND ENGINEERING NEWS.

SEWAGE PURIFICATION SCHEME, EIGHTON BANKS, DURHAM.—The Chester-le-Street Rural District Council have decided to consult Mr. D. Balfour, M.Inst.C.E., of Newcastle-on-Tyne, as to a scheme of sewage purification for Eighton Banks in their Union.

PIER, MORECAMBE, LANCS.—The contract for the construction of a pier at Morecambe has been let to the Widnes Foundry Company, Lancashire. The engineers, Messrs. Mangnall & Littlewoods, are engaged upon estimates for the pavilion, which will be let separately.

MONMOUTH SEWERAGE AND ELECTRIC LIGHT.—At a special meeting of the Monmouth Town Council, held on Monday, the revised plans of Mr. Nicholson Lailey for drainage within the borough, at a cost of 6,137*l.*, were adopted. It was resolved to apply for power to borrow 20,000*l.*, to carry out the combined scheme. Messrs. Bramwell & Harris are acting as engineers for the electric light, and Mr. Lailey for the sewerage of the borough.

ROCHDALE SEWAGE WORKS EXTENSION.—The Rochdale Corporation have decided to borrow 40,000*l.* for sewage extension, and on the 21st inst, Mr. Rienzi Walton, Inspector of the Local Government Board, held an inquiry at the Rochdale Town Hall. Mr. S. S. Platt, the surveyor, explained the scheme, which includes the provision of precipitating tanks, buildings, and machinery for dealing with the sludge, and the acquisition of 11¼ acres of land adjoining the existing sewage farm. There was no opposition.

SEWAGE DISPOSAL, CHESTER-LE-STREET.—The Chester-le-Street Rural District Council have instructed Mr. D. Balfour, M.Inst.C E., of Newcastle-on-Tyne, to prepare a scheme of main sewerage and sewage disposal for the populous townships of Maworth and Washington in their district, having received notice from the Durham County Council, under the Rivers' Pollution Act.

DRAINAGE WORKS, GRIMSBY.—The pumping-station and the new drainage works for the borough of Grimsby, just carried out at a cost of 32,000*l.*, were opened on the 25th inst., by Alderman George Doughty. The work has been carried out under the superintendence of Mr. Marshall Petree, the Borough Engineer.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, ST. JOHN'S CHURCH, BETHNAL GREEN.—A large stained glass memorial window was publicly unveiled in this church on Sunday last. It is erected to the memory of the late Mr. Keymer, of Whitefriars, by many friends. The subject chosen was "Our Lord Blessing Children," as being appropriate in reference to the fact that Mr. Keymer had been superintendentof the Sunday-schools for many years. The window was executed by Messrs. Alex. Gibbs & Co., of London.

WINDOWS, ST. JAMES' CHURCH, PAISLEY.—Two pair of stained-glass windows have just been placed in the east isle of the St. James' U.P. Church by the trustees of the late Mrs. Brown, who had directed her trustees to devote a part of her estate to the erecting of windows commemorative of her deceased husband. One of the conditions mentioned by Mrs. Brown was that the architect of the church, Mr. Hippolyte J. Blanc, A.R.S.A., Edinburgh, should be consulted on the subject of illustration. When the matter was submitted to Mr. Blanc, he drew up a scheme of illustration, whereby all the windows can be treated with appropriate subjects and designs in harmony with the architecture of the church. According to the scheme, the east aisle, which has six lights, is to be devoted to representations of the Christian graces. The windows now put in form part of the general design. One pair represent Charity and Hope and the other Virtue and Knowledge. The work has been executed by Messrs. Stephen, Adam, & Co. Glasgow.

FOREIGN AND COLONIAL.

FRANCE.—The annual exhibition of the "Pastellistes Français" will be opened in the Georges Petit Gallery on April 6.——The Société Nationale des Architectes has chosen this year, as the subject of its fourth annual competition, a "Maison de Retraite" for architects, sculptors, and painters, &c.——To-day (Saturday) the President of the Republic will open the new prolongation of the Sceaux Railway, at the Place Médicis.——It is announced that an international exhibition of Hygiene will be held this year in the Palais des Arts-Libéraux, but no date is yet fixed.——M. Duprez, architect to the Municipality of Paris, has submitted to the Council a design for a monument to be erected in Mont-Parnasse Cemetery to receive the remains of workmen who have been accidentally killed in the Municipal service. The design shows a stele crowned with ornament containing objects symbolical of artisans' work, and a pedestal decorated with the armorial bearings of the city. An allegorical statue

of Paris will be introduced leaning against the stele, which will be surrounded by a kind of hemicycle in stone.——M. Cominck has been appointed Director of the Municipal School of Art at Dijon.——The Department of Bâtiments Civils has been making a careful examination of the condition of the Arc de l'Etoile, about which there has been a good deal of anxiety lately. The result is that the condition of the monument is not so bad as was supposed, and that it will not require more than the repair or the rebuilding of the attic and of the pavement of the top.——The death is announced, at Fécamp, of M. Victor Hamel, a distinguished etcher, at the age of 63. He had been for twenty years a regular exhibitor at the Salon.

MISCELLANEOUS.

APPOINTMENT OF ARCHITECT FOR NEW SCHOOLS.—At a meeting of the Croydon School Board on the 19th inst. the Works and General Purposes Committee recommended that the Board be advised to permit Mr. R. Ridge to submit plans for schools to be erected on the Wildbores estate for their approval or otherwise, but that this arrangement with Mr. Ridge be not taken as a precedent for future guidance. Dr. Carpenter moved the adoption of the minutes of the Works Committee. He did not think the paragraph called for any remarks, as the recommendation was unanimously carried at a committee meeting which was attended by almost all the members of the Board. Colonel Iredell seconded the adoption of the Committee's minutes, which were carried.

DRAINAGE OF THE VALLEY OF MEXICO.—According to a recent report of the British Minister at Mexico, the great works being carried out by Messrs. Pearson & Son, having for their objects the reduction in volume of the waters surrounding the city, and procuring the necessary drainage outfall, are approaching completion. In fourteen months the great waterway for the escape of the imprisoned floods of the valley, which in centuries past have been a constant menace to the safety of the city, will be opened. The canal and six-mile tunnel through the mountain range have a total length of near forty miles, and the latter is complete. The sewers of the city of Mexico form a network of covered channels, sometimes in the middle and sometimes on the sides of the streets, there being almost always gorges communicating with a system of secondary sewers that empty into a collecting sewer, discharging into the canal of San Lazaro, which conveys the sewage to Lake Texcoco. If the lake is high, water backs up into the sewers and saturates the soil under the houses and streets. As this has been the case for several centuries, the state of the subsoil under the city can be better imagined than described. Malarial and gastric fevers are almost continually epidemic, and the elevation of over 7,000 ft. is all that saves the city from a pestilence.

COUNTY MAP OF LONDON.—Mr. E. Stanford's County Map of London, in twenty sheets to a scale of 4 in. to a mile, is a most useful and convenient one. The scale allows of street names being clearly printed and easy to read, while the comparatively small size of the sheets enables the whole to be enclosed in a comparatively small portfolio, which takes up little room and is convenient for reference.

ENGINEERING APPOINTMENT.—We understand that Mr. William Thomas Olive, M.Inst.C.E., late Resident Engineer on the Manchester Main Drainage Scheme, has obtained by open competition the appointment of City Engineer of Cape Town. Mr. Olive was in the service of the Manchester Corporation for a period of fifteen years.

SOUTH WALES PORTLAND CEMENT AND LIME CO.—We are informed that this company has taken over and absorbed into its own business the Aberthaw Pebble Lime Co. (Aberthaw) and the Aberthaw Blue Lias Co. (Bridgend).

EFFECTS OF THE COLD WEATHER.—Dr. A. Wynter Blyth, Medical Officer of Health for the Parish of St. Marylebone, in his "Sanitary Chronicles" of that parish for the month of February, refers to the discomfort experienced by most households during the recent cold weather. The arrangements generally of our sanitary appliances, he says, are ill-adapted to stand temperatures continuing for three weeks many degrees below zero. If, indeed, such seasons frequently recurred, it would be absolutely necessary to place all soil-pipes inside the premises, to relay every service-pipe at a depth of not less than three feet, and to make some very special provisions with regard to the removal of refuse. Careful temperatures, taken by Mr. Sowerby at the Botanical Gardens, Regent's Park, show that the frost in that particular locality did not penetrate to quite two feet in the ground, but from this it would be unwise to argue that a depth of two feet would protect everywhere the water service; the penetration of cold will vary according to the porosity and other characters of the soil in different places; a main 2 ft. 6 in. in depth, for example, has been found frozen; it is, however, probable that so far as the soil in this parish is concerned, a minimum depth of three feet for a water service-pipe would be a sufficient protection.

CHURCH BUILDING SOCIETY.—The Incorporated Society for Promoting the Enlargement, Building, and Repairing of Churches and Chapels, held its usual monthly meeting on Thursday, last week, at the Society's House, 7, Dean's-yard, Westminster, the Rev. Canon C. F. Norman in the chair. Grants of money were made in aid of the following objects, viz.:—Building the new church of St. John, Cambridge, 125*l.*; rebuilding on a new site the church of St. John the Evangelist, Wortley-le-Leeds, 60*l.*; and towards enlarging or otherwise improving the accommodation in the churches at Ash-next-Sandwich, St. Nicholas, Kent, 40*l.*; and Imber, St. Giles, near Codford, Wilts, 30*l.* A grant was also made from the Mission Buildings Fund towards adapting St. Paul's Mission Church, Barnsley, Yorks, 30*l.* The following grants were also paid for works completed:—Grimsby, St. Paul, 100*l.*; Ramsbury, Holy Cross, Wilts, 50*l.*; Trelleck, St. Nicholas, near Monmouth, 40*l.*; Westmarsh, Holy Trinity, near Dover, 15*l.*; Barnsley, St. Peter, 30*l.*; and Canton, St. Catherine, near Cardiff, 50*l.*—The annual general Court of this Society will be held on Wednesday, the 8th of May, at the Church House, at 2.30 p.m. The chair will be taken by the Archbishop of York.

NOTICE OF REMOVAL.—The Acme Wood Flooring Co., Limited, of Gainsborough-road, Victoria Park, announce the completion of, and removal to, their new saw-mills and manufactory, situated on the River Lea Navigation.

AUTOMATIC ROPE-GRIP FOR HOISTS.—This, which is patented by Mr. J. W. Martin (Manchester), is a contrivance by which a bar across the opening to a lift, which has to be raised for access to it, by the action of raising it automatically clips the hoisting rope, b sides covering it from the reach of the attendant's hand, so that the lift cannot possibly be started while any one is getting in or out of the lift. The gripper is actuated by a short arm on the other side of the centre on which the bar turns, forming a solid portion of the bar.

ORGAN, BROADHEMBURY CHURCH, DEVONSHIRE.—An organ has just been placed in Broadhembury Church, which has been presented by Mr. C. B. Heberden, Principal of Brasenose College, Oxford. The instrument, enclosed in an oak case designed by Mr. G. Fellowes Prynne, is built by Hele & Co., of Plymouth and Exeter.

DAMAGE AT PETERBOROUGH CATHEDRAL.—No less than three pinnacles were blown from the towers of Peterborough Cathedral during last Sunday's gale, one from the north-east and two from the south-west tower, and the nave-roof has been considerably damaged. It is feared, too, that the west front has suffered. The amount of damage done to property in the city is almost inconceivable, and there is scarcely a building in the exposed parts that has not suffered.

VICTORIA EMBANKMENT. — Rutty's macadam road "Scarifier," to which we have before referred, is to be tried, we are informed, on the Victoria Embankment roadway. This will afford an opportunity for the next few weeks for those interested in road repairing and maintenance to observe its working and results.

LEGAL.

DECISION UNDER THE LONDON BUILDING ACT, 1894.

THE case of the party-wall between Nos. 1 and 3 Church-street, Minories, again occupied the attention of the magistrate at the Thames Police-court on Saturday last. It will be remembered that in the case of Watkins *v.* Crow, which was reported in our issue of March 2, the District Surveyor by "notice of objection" served under Sec. 150 of this new Act, sought to compel the owner of No. 1, Church-street, to bring the party-wall next No. 3 into conformity therewith. The facts disclosed at that hearing were briefly these:—As the result of a fire in November last, the warehouse No. 3 was almost entirely down. No. 1 was slightly damaged, and the party-wall between them had been pulled down, under a dangerous structure notice, to the extent of one-third of its superficial area. At the time that case was heard, the owner of No. 1 had given notice, under Sec. 145, of his intention to reinstate the party-wall in question. The owner of No. 3 appeared to have taken no steps towards rebuilding his warehouse. It was admitted that so far as regarded No. 1 the wall need not be altered, because since No. 1 had not been destroyed for more than half its cubical extent, the reinstatement thereof would not be a "new building," as defined by Sec. 5 (6), and it was also admitted that since the party-wall itself had not been destroyed to the extent of one-half of its superficial area it could not be dealt with under Sec. 208, but it was contended, on behalf of the District Surveyor, that as No. 3 had been destroyed for more than half its cubical extent, and the reinstatement thereof would accordingly be deemed to be the erection of a "new building," therefore every part of such building, including this party-wall, must be made to comply with the London Building Act, 1894.

It was then held by Mr. Haden Corser that since no notice had at that time been given for the rebuilding of No. 3, and the objection was given on the notice of the owner of No. 1, the party-wall must be considered in its relation to No. 1 only, and that as No. 1 had not been damaged sufficiently to bring it within the definition of a "new building," under Sec. 5 (6), and the party-wall had not been taken down or destroyed to the extent of one-half, so as to bring it within the scope of Sec. 208, the wall could be reinstated without regard to the requirements of the new Act.

About a fortnight after this decision Mr. Samuel Redhouse, builder, of Stotfold, Baldock, Herts, gave the District Surveyor notice of his intention to re-build No. 3, whereupon the District Surveyor, Mr. Arthur Crow, served on Mr. Redhouse, a "notice of objection" with regard (*inter alia*) to this party wall; hence the present proceedings before Mr. Dickinson.

Mr. T. Seager Berry, of the solicitor's department of the London County Council, appeared for the District Surveyor. A preliminary objection was taken by Mr. Cobban, solicitor, on behalf of Mr. Redhouse, on the ground that the party-wall was the same wall which had formed the subject of the former proceedings, when Mr. Hayden Corser had decided that the District Surveyor's notice must be disallowed. Mr. Berry contended that the circumstances had entirely changed, and that they were now dealing with a building which came within the definition of a "new building," and thus a case had arisen, such as Mr. Hayden Corser had expressly declined to give an opinion on, when the possibility of its arising was suggested to him, and it was under these new and different circumstances that the District Surveyor now asked that this party-wall should be amended. In reply to a question from the learned magistrate, Mr. Cobban contended that it was immaterial whether No. 3, Church-street, were a "new building" as defined by Sec. 5 (6) or not, but that the question really was as to how far this party-wall had been taken down: if more than half, then it must be rebuilt under Sec. 208; if less than half, it need not be altered. He submitted further that both the buildings, No. 1 and No. 3, might be entirely destroyed, and yet if half the party-wall remained intact even then the wall need not be altered. Mr. Dickinson said this was a very strong suggestion to make, and Mr. Berry urged that it was going back on previous legislation, for Sec. 10 of the Act of 1855 clearly laid down that when an old building was more than half destroyed, the remainder, so far as not in conformity with the then new law, had to be pulled down, and the object of Sec. 208 was to supplement Sec. 5 (6) which virtually re-enacted Sec. 10 of the Act of 1855, and not to in any way derogate from such section, and that Sec. 208 referred to the case of a party or external wall *per se*, and intended that although a building itself might not be half destroyed, yet any one wall of it, if destroyed or taken down to the extent of half, should be not of necessity pulled down but brought into conformity with the new law as regards the whole of such wall.

Mr. Dickinson, after carefully considering the Sections quoted, upheld Mr. Cobban's contention, and decided that Sec. 208, which dealt with party-walls (and external walls), must govern the case, and that notwithstanding the fact that No. 3 was destroyed for more than half its cubical extent, yet as half the party-wall had not been destroyed, the new law did not require that the wall should be made conformable thereto, and said that he ruled that Sec. 208 ousted the provisions of Sec. 5 (6) as to party and external walls. The District Surveyor's notice was accordingly disallowed.

The Magistrate expressed his willingness to state a case if asked, and declined to grant costs, saying that he considered it was a proper case to have been taken up by the District Surveyor in the public interest.

MEETINGS.

FRIDAY, MARCH 29.

Architectural Association.—(1) Mr. H. Holloway on "Specifications from a Builder's Point of View." (2) Mr. E. C. Pinks on "Specifications from an Architect's Point of View." 7.30 p.m.

Building Trades' Exhibition (Lectures and Conferences, Agricultural Hall, Islington).—Conference on "The London Building Act, 1894," to be opened by Professor Banister Fletcher. 3 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Mr. H. Law on "Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale." 8 p.m.

SATURDAY, MARCH 30.

Architectural Association.—Visit to St. Peter's Church, Mount Park-road, Ealing. 3 p.m.

Building Trades' Exhibition, Islington.—Workmen's competitive handicraft. 2 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Inspection and Demonstration of Harrison & Barber's Knacker Yard, Whitechapel.

London and Provincial Builders' Foremen's Association (Memorial Hall, Farringdon-road, E.C.).—Mr. Ackerman on "Present Day Apprenticeships." 9 p.m.

St. Paul's Ecclesiological Society.—Visit to the Crypt of St. John, Clerkenwell. 3.30 p.m.

Edinburgh Architectural Association.—Visit to (1) Dalmeny House, (2) The Carmelite Priory Church, South Queensferry, (3) Dalmeny Church.

Queen's College, Cork.—Mr. Arthur Hill on "The History of Architecture." XVII. 3 p.m.

SUNDAY, MARCH 31.

South Place Institute.—Mr. Sidney Webb on "The Place of Trade Unionism in Industry." 4 p.m.

MONDAY, APRIL 1.

Surveyors' Institution.—Mr. G. Cadell on "Forestry." 8 p.m.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Hospital	Kirkcaldy T.C.	.....	May 1
*School Buildings	Llanelly Intermediate & Technical Schools	.....	May 15
*Shops, Offices, Two Hotels, &c. Preston	N. Miller	150*l.*, 100*l.*, and 50*l.*	May 27

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Brick Main Sewer, &c.	Hastings Corp.	P. H. Palmer	April 1
*Sewerage Works, Clive Valley District	do.	do.	
Church, Knock, Belfast	.....	S. P. Close	April 2
Alterations to Church, Castle Eden, Durham	.....	C. H. Fowler	do.
Alterations, &c. to National Schools, Glyntaff, near Treforest, Wales	.....	Thos. Rowland	do.
Additions, &c. to School, Tywardreath, Cornwall	.....	W. J. Samble	do.
Additions to Farmhouse, Woodend, Aberdeen	.....	.....	do.
York Stone Flagging (2,000 yds.)	C. & P. H. Chalmers	.....	do.
Macadam, Llantrisant and Llantwit Fardre	Folkestone Corp.	J. White	do.
Cemetery Extension, Walls, &c.	Pontypridd High. Bd.	J. Griffiths	do.
Alterations, &c. to Chapel, Cymmer, near Pontypridd	Barnstaple Burial Bd.	F. W. Petter	do.
Sewerage Works, Fountainhall-road, &c.	T. Griffiths	T. Broderick	do.
School Buildings, Halesworth, Suffolk	Aberdeen Town Coun.	G. T. Lynam	do.
Welsh Granite Setts and Kerbs	National Sch. Mangrs.	*Official*	do.
Three Cottages, Fawley, Herefordshire	Prestwich(Lancs)U.D.C	do.	do.
*Portland Cement and Stoneware Pipes	G. W. Ry. Co.	do.	do.
*Granite for Road Metalling	East Ham U.D.C.	do.	do.
Sewer, Lower Market-street	Hove U.D.C.	do.	April 3
Four Cottages, Brook-street, Prospect, Hoyland, Yorks.	do.	do.	do.
Sheds and other Buildings, Belfast	.....	J. W. Wilson	do.
Schools, Haydon, Wilts	N.E. Agric. Assoc.	R. Watt	do.
Whinstone Road Metal	Rodbourne Cheney Sch. Board	W. Drew	do.
Cemetery Chapels, &c. near Wakefield	Ruthergien (N.B.) Twn Commrs.	S. M'Bride	do.
Pipe Sewer, &c. Golden-street, Patricroft, Lancs	Hemsworth R.D.C.	M. Richardson	do.
Stoneware and Cast-iron Pipe Sewers, Tibshelf, Derby	Eccles Corporation	A. C. Turley	do.
Sewers, Belmont-street	Blackwell R.D.C.	H. Walker	do.
Earthenware Pipe Sewers, near Barnsley	St. George's (Bristol) U.D.C.	T. L. Lewis	do.
Alterations, &c. to Technical College, Bradford, Yorks.	Ardsley U.D.C.	T. S. McCallum	do.
Thirteen Cottages, Gilfach Goch, Glam.	.....	T. C. Hope	April 4
House and Shop, Dene Side, Great Yarmouth	.....	Griffiths & Jones	do.
Pipe Sewers, &c. (1,540 yds.)	.....	Sidney Rivett	do.
Schools, near Northampton	Blaydon-on-Tyne U.D.C.	W. S. Simpson	do.
Cast-iron Pipes	Cogenhoe School Bd.	H. H. Dyer	do.
Pavement (1,000 yds.) Britannia-road	Salford Corporation	*Official*	do.
*Reconstruction of Offices, &c.	Slaithwaite (Yorks) D.C.	do.	April 5
Laying water Mains, Coppull	Cardiff Gas Light and Coke Co.	H. Morley	do.
Two Houses, Navigation, Aberdare, Mon.	Chorley R.D.C.	Jolley & Buckley	do.
Laying Cast-Iron (6 miles)	W. Davies	.....	April 6
Broken Granite (16,500 tons), Aylesbury	Bristol Waterworks Co.	T. & C. Hawkaley	do.
Additions, &c. to School, Dukestown, near Tredegar, Mon.	Bucks C.C.	R. J. Thomas	do.
School Buildings, Inchbrook, near Nailsworth, Glos.	Llangynider Sch. Bd.	.....	April 7
	.....	M. H. Medland	April 8

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Road Works, Widening, &c. Bradfield-road	Crewe T.C.	G. Eaton-Shore	April 8
Paving, Flagging, &c. Several Streets	Batley (Yorks.) T.C.	H. Dearden	do.
Registrar's House, and Chapel	Denton (Lancs.) U.D.C.	G. H. Newton	do.
*Road Works	Hornsey U.D.C.	E. J. Lovegrove	do.
*Blue Bricks	Edmonton U.D.C.	G. E. Eachus	April 9
*Broken Granite and other Materials	Southgate U.D.C.	C. G. Lawson	do.
*Wood Paving Works	Com. of Sewers (City of London)	*Official*	do.
*Sewage Works	St. Luke's Vestry	do.	April 10
Sewerage Works	Mold (Flints) U.D.C.	W. H. Radford	do.
Pipe Sewer, Stubber's Green, Aldridge	Walsall R.D.C.	T. T. Fisher	do.
Additions to Workhouse Infirmary, near Sheffield	Penistone Union	G. A. Wilde	do.
*Making-up Roads, &c.	Fulham Vestry	C. Botterill	do.
Waterworks, Wingate-lane, co. Durham	Easington R.D.C.	D. Balfour	April 11
*Pipe Sewers	St. Martin-in-the-Fields Vestry	C. Mason	do.
Court House, Ruabon	Denbigh C.C.	R. L. Williams	April 12
Schools, Queen-street, Abertillery, Mon.	.....	Geo. Rosser	April 15
Station Offices, &c. Ardee, Dublin	G. N. Ry. Co. (Ireland)	W. H. Mills	do.
*Bessemer Steel Tram Rails	Manchester Corp.	*Official*	do.
Sewers, Manholes, &c.	Thornhill (Yorks) U.D.C.	J. C. Haller	April 16
*New Schools	Darenth Sch. Bd.	F. M. Kirby	April 17
Brickwork Sewers, &c.	Stockport Corp.	A. M. Fowler	April 22
*Superstructure of Extension of Asylum	Newcastle-upon-Tyne Lunatic Asylum	J. W. Dyson	April 23
*Timber Shelters, Clissold Park and North Woolwich Gardens	LondonCountyCouncil	*Official*	do.
*Machinery, &c.	Borough of West Ham	Lewis Angell	May 14
Stores and House, Higham Ferrers, Northants	Co-op. Soc.	H. Adnitt	No date
Schools, Bridge-street	Morley(Yorks.) Sch. B.	Holtom & Fox	do.
Four Houses, Ormerod-road, Burnley	Jas. Grimshaw	C. Parsons	do.
Stabling, Surgery, &c. Egerton House, Wrexham	Richd. Williams	J. H. Swainson	do.
House, &c. near Thirsk Junction, Yorks.	Jno. Ellis	Thos. Stokes	do.
Technical Institute, Kew-road, Richmond	Surrey C.C.	F. W. Fryer	do.
Four Houses, Dogathorpe-road	Mr. Christian	J. G. Stallebrass	do.
Four Houses, Rock-road, Rushden, Northants	E. Wooding	H. Adnitt	do.
Eight Houses, Warrington-road, Platt Bridge, near Wigan	W. Evans	.....	do.
Factory, Hambleton, near Selby	Anson Bros.	.....	do.
*Block of Flats, Bloomsbury	.....	E. J. W. Hider	do.
*Works and Repairs to Military Buildings	War Department	*Official*	do.
*Works, &c. at various places	Midland Railway	.....	do.
Four Houses, Hunslet, Carr, Leeds	.....	P. Robinson	do.
Foundations of Storage Warehouse, Ship Canal Quay, Manchester	.....	C. Heathcote	do.
Warehouse, &c. Burley-in-Wharfedale	.....	W. J. Morley	do.
Methodist Chapel and Schools, Ann's-road, Heeley, Sheffield	.....	W. J. Taylor	do.
Fifty Houses, Ashton-under-Lyne	.....	T. D. Lindley	do.
Boundary Wall, &c. Carlisle	.....	H. H. Hodgkinson	do.
*Laundry Buildings, Canterbury	.....	W. J. Jennings	do.
*Supply of Bricks, Sand, &c.	J. J. Smith	.....	do.
*New Premises, Sheffield	Prudential Assurance Co. Lim.	A. Waterhouse & Son	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
Highway Surveyor	Pershore R.D.C.	130*l.*	April 2
Surveyor	Ticehurst (Sussex) R.D.C.	100*l.*	April 4
Highway Surveyor	Swaffham (Norfolk) R.D.C.	120*l.*	April 6

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., viii., ix., and xxi. Public Appointments, p. xviii.

Building Trades' Exhibition (*Lectures and Conferences*).—Mr. H. Ansell on "Glazed Brick-making." 3 p.m.—Professor Banister Fletcher on "Comparative Architecture." 7.30 p.m.

Society of Engineers.—Mr. D. B. Butler on "Portland Cement: Some Points in its Testing, Uses, and Abuses." 7.30 p.m.

TUESDAY, APRIL 2.

Building Trades' Exhibition (*Lectures and Conferences*).—Conference of Brickmakers, followed by a paper by Mr. A. Crossley, entitled "British *v.* American Brickmaking." 3 p.m. Conversazione of Clay-workers, 7.30 p.m.

Institution of Civil Engineers.—Messrs. J. I. Thornycroft, F.R.S., and Syd. W. Barnaby, on "Torpedo-Boat Destroyers." 8 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Professor T. Roger Smith on "Sanitary Building Construction." 8 p.m.

Society of Biblical Archæology.—8 p.m.

Glasgow Architectural Association.—Mr. John White on "The Work and Influence of the Adams in Scotland." 8 p.m.

WEDNESDAY, APRIL 3.

Architectural Association.—Visit to the Building Trades' Exhibition, Agricultural Hall, Islington. (See advt.)

Building Trades' Exhibition (*Lectures and Conferences*).—Mr. J. T. Norman on "Some Chemical Aspects of Clay-working." 3 p.m.

Carpenters' Hall (*Free Lectures on Matters connected with Building*).—Mr. W. R. Lethaby on "Wood Carving, and Designing for it." 8 p.m.

British Archæological Association.—Mr. E. P. Loftus Brock on "Excavation of a Roman Villa at Wadfield, Sudeley Castle." 8 p.m.

Society of Arts.—Mr. John J. Holtzapffel on "Sand Blast Processes." 8 p.m.

Sanitary Institute.—Discussion to be opened on "Combined Drainage from the point of view of Health, Construction, Administration, and Law," by Dr. John F. J. Sykes, and Mr. Wm. Nisbet Blair. 8 p.m.—Inspection and Demonstration at Casual wards, Milman's-street, King's-road, and Disinfecting-station, Lot's-road, Chelsea. 2 p.m. Conducted by Dr. Louis Parkes.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8 p.m.

Liverpool Engineering Society.—Mr. J. Reney Smith on "Engineering work and Operations at Perim Island." 8 p.m.

Carlisle Architectural, Engineering, and Surveying Association.—Mr. R. Rogerson on "Tacheometry, or Rapid Surveying."

Edinburgh Architectural Association.—(1) Mr. John Kinross, A.R.S.A., on "The Priory, St. Andrews." (2) Mr. Thomas Bonnar on "Ancient Mural Decorative Art in Scotland." 8 p.m.

THURSDAY, APRIL 4.

Building Trades' Exhibition.—Conference, "The Manufacture of Cement." 3 p.m.

St. Paul's Ecclesiological Society.—Mr. Andrew Oliver on "The Brasses and Matrices at St. Albans Abbey." 7.30 p.m.

Society of Antiquaries.—8.30 p.m.

FRIDAY, APRIL 5.

Institution of Junior Engineers.—Mr. Walter G. McMillan on "The Study of Alloys." 8 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Professor W. H. Corfield, M.A., on "Sanitary Appliances." 8 p.m.

Institution of Civil Engineers (*Students' Meeting*).—Mr. Henry Home on "The New South Pier, Sunderland." 8 p.m.

SATURDAY, APRIL 6.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Visit and Inspection of Earl Surrey Waterworks, &c., Kenley.

Queen's College, Cork.—**Mr. Arthur Hill on "The History of Architecture." XVIII. 3 p.m.**

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

3,153.—WINDOWS: *A. Hartley.*—This invention provides means for opening sliding sashes into the room for easy access to the external face of same. Two strips of metal, one for each sash, are curled to a circular shape, and fixed to one of the pulley stiles, and two similar pieces made to fit inside the former are attached to the sashes, thus forming a hinge, which allows the window to slide up or down, or to be opened inwards as desired.

6,285.—ROOFING SLATES: *A. R. Pollard.*—This patent relates to means for securing roofing slates by means of an ⊥ shaped piece of metal, having a V shaped notch cut in the upright part, and a square hole for the reception of a wedge, chiefly for fastening loose slates. The part forming the base is pushed under the joint below the slate, which is loose, and is wedged firmly, so that the upright part holds the loose slate in position.

6,552.—FIREPROOF FLOORS: *J. Blakesley.*—The fireproof material is formed in the shape of arches, resting on the joists, and having hanging limbs, which hold flat tiles, to form a level ceiling on the under side.

6,563.—WINDOW FRAMES: *G. Couch.*—For cleaning the outside sashes from the inside, and excluding dust, air, &c., also for securely locking same. Special hinges are inserted in the face of the pulley stiles to carry any desired length of stop and parting beads. Additional grooves are formed in the pulley stile to allow the sashes to turn clear of the parting bead, and outside lining sliding pivots are fixed to each angle of bottom sash, and formed hollow to receive the sash-lines. Air, dust, &c., is excluded by forcing the top sash tight against the outside lining, and the bottom sash on to the parting beads by means of wedge-shaped pieces, fixed near each meeting rail angle of sashes. Fastening is effected by means of a spring-controlled finger mounted on each side of the lower sash.

6,764.—WINDOWS: *W. Nicol.*—Method of making windows watertight, &c., and facilitating cleaning same. Two vertical plates formed at their outer edge of a curved or ring shape, are fitted on to the pulley stiles, and a similar shaped plate is fitted to each sash-stile with a hook fitting into the corresponding end of vertical plate on fixed stile, so that the sash frame can slide up and down, or be swivelled into the apartment. Hook-shaped duplex plates can be fitted to the opposite side to which the window is hinged for excluding draughts, &c.

7,525.—CHIMNEY-COWLS: *J. Pitt.*—Consists in mounting the cowls on wheels or rollers, which are pivotted to a flange attached to the movable part of the cowl and run on a similar flange attached to the lower or fixed part. The cowl is thus allowed to rotate, and there is no internal obstruction to the sweep's brush.

7,971.—CHIMNEY-TOPS: *D. Curr.*—For preventing down-draught, &c., a number of inverted cone-shaped tubes are arranged one above another, so as to overlap and allow for the escape of smoke, the lowest fitting into the chimney-pot. The whole is surmounted by a cap, with a metal band breaking the joint between the cap and upper cone and preventing any direct draught blowing into the cowl.

263.—WOODWORKING CHISELS: *G. Goller.*—A chisel with a serrated edge for cutting small grooves, and provided with gaps for withdrawing the little chips made by each cut of the tool.

NEW APPLICATIONS FOR LETTERS PATENT.

MARCH 11.—5,088, H. Bagshaw, Metal-plate Roof Ventilator.—5,111, G. Stevens, Indicating and Localising Stoppages by frost in water-pipes, and to prevent pipes from bursting, and to avoid explosions in kitchen-boilers.

MARCH 12.—5,161, E. Verity and B. Banks, Ventilators.—5,163, E. Verity and B. Banks, Floor Cramps.—5,165, H. Higgins, junr., Door Locks.—5,171, T. Twyford, Water-closets or Water-closet Basins.—5,210, J. Adams, Silent-closing Door-springs.—5,232, A. Boult, Wood-cutting Machines.—5,274, S. Hellyer, Lavatory Basins, Sinks, &c. 5,280, B. Thwaite and W. Johnson. Firing Kilns.

MARCH 13.—5,282, L. Symonds, Fire-grates or Stoves.—5,298, J. Sandall, Band-saw Guide.—5,325, W. Moore, Syphon Closet-pans.

MARCH 14.—5,365, J. Macdonald, Syphon Flushing-cisterns.—5,366, J. Macdonald, Oil lamps for removing paint, plumber's work, &c.—5,376, J. & H. White, Wood-block flooring and pavements.—5,396, J. De Long, Window Ventilators.—5,423, A. Cooper, Window-sashes.

MARCH 15.—5,464, W. Metcalff, Draught and Rain Excluders and Door Silencer.—5,465, W. Marshall, Construction of Window-casements and Frames.—5,470, J. Carr, Mechanism for cutting the edges of wall-papers.—5,497, J. Mark, Water-pipes. — 5,498, L. Higginson, Ladder Scaffold Bracket.—5,501, H. Johnson, Door-bolts.—5,519, W. Seymour, Preventing bursting of pipes in frosty weather.—5,534, H. Norfolk, Sash-windows.

MARCH 16.—5,561, W. Bruce, Heating and Ventilation of buildings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

706, G. Locke, Up-Draught Chimney-Pot.—984, C. Phillips, Fastener for Doors, Sashes, Frames, &c.—3,296, W. Phillips, Sash Windows.—3,402, M. Donnet and C. Matthews, Hinges.—3,604, J. Worthington, Bricks and Tiles.—3,896, A. Murray and T. Highet, Sash-Windows.—3,900, W. McCaig, Preventing Kitchen Boilers Exploding.—3,916, T. Smith, Device for Temporarily Repairing Burst Water-pipes, &c.—3,941, H. Kennard and D. Campbell, Open Fireplace Fittings.—4,080, J. Aday, Hinges.—4,109, C. Devenish, Windows, Doors, &c.—4,345, P. Dunstall, Cutters for Wood-working Machinery.

COMPLETE SPECIFICATIONS ACCEPTED.

(*Open to Opposition for Two Months.*)

7,776, C. Challis, Gratings or Strainers for Sinks, &c.—9,552, J. Penwill, Drain Trap.—2,822, W. Shoosmith, Closet Traps.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

MARCH 15.—By *Buckland & Sons:* 54, Brunswick-rd. Brighton, f., r. 85*l.*, 1,450*l.*; 24, Russell-st., Covent-garden, f., r. 125*l.*, 3,725*l.*—By *Humphreys, Skitt, & Humphreys:* 15 and 16, Croom's Hill Grove, Greenwich, u.t. 40 yrs., g.r. 14*l.*, 130*l.*—By *Robert Reid:* "Fernside," Claremont-rd., Surbiton, f., with a piece of land in rear, u.t. 8½ yrs., g.r. 22*l.* 10s., 1,850*l.*; 230, New North-rd., Islington, u.t. 2 yrs., g.r. 11*l.* 4s., 265*l.*; 13, Redman's-rd., Mile End, f., r. 50*l.*, 680*l.*; 10, Mount Pleasant, Clerkenwell, f., r. 53*l.*, 1,135*l.*; i.g.r. of 25*l.* 4s. Islip-st., Kentish Town, u.t. 54 yrs., g.r. 15s., 545*l.*; i.g.r. of 20*l.*, Peckwater-st., u.t. 54 yrs., g.r. 1*l.*, 440*l.*: i.g.r. of 18*l.* 18s., Wolsey Mews, u.t. 53 yrs., g.r. 5s., 310*l.*

MARCH 18.—By *Elliott, Son, & Boyton:* "Newbery's Cottages," Bourne End, Bucks, f. 260*l.*; 16, George-st., Euston-rd., u.t. 28 yrs., g.r. 20*l.*, r. 60*l.*, 450*l.*; 15, Birdhurst-rd., Croydon, u.t. 87 yrs., g.r. 15*l.*, r. 75*l.*, 700*l.*—By *Oetzmann & Co.:* 49, Narcissus-rd., Hampstead, u.t. 113 yrs., g.r. 4*l.*, r. 42*l.* 2s., 485*l.*—By *Henry Hooper:* 30 and 32, Somers-rd., Walthamstow, u t. 83 yrs., g.r. 12*l.*, 236*l.*; 38, Somers-rd., u.t. 83 yrs., g.r. 6*l.*, 120*l.*

MARCH 19.—By *Bisley & Sons:* 7 and 9, Silwood-st., Rotherhithe, u.t. 61 yrs., g.r. 6*l.* 5s., r. 62*l.* 10s., 385*l.*; 18 and 20, Hawkstone-rd., u.t. 66 yrs., g.r., 7*l.*, 550*l.*; 46, Drummond-rd., Bermondsey, and a ground rent of 10*l.*, u.t. 46 yrs., g.r. 11*l.*, 365*l.*—By *Alfred Richards:* "Derwent Lodge," Newnham-road, Wood Green, f., 455*l.*; 82 and 84, Bromley-st., Commercial-rd. East, u.t. 13 yrs., g.r. 7*l.* 10s., 235*l.*—By *Rutley, Son & Vine:* 49, Harvist-rd., Holloway, u.t. 48 yrs., g.r. 6*l.* 10s., 275*l.*; No. 111, Pentonville-rd., u.t. 32 yrs., g.r. 27*l.*, 85*l.*; 51 and 53, Clarence-rd., Kentish Town, u.t. 44 yrs., g.r. 10*l.*, r. 70*l.*, 635*l.*—By *Ball, Norris & Hadley:* 22, Alexandria-rd., Ealing, f., r. 19*l.*, 295*l.*—By *Humbert, Son & Flint* (At Watford): A plot of building land, Middlesex, Harefield, o a. 2 r. 32 p., f., 350*l.*; 244, High-st., Watford, f., 800*l.*; 229 and 231, High-st., with warehouse premises in rear, f., 3,060*l.*; "Lammas Lodge," Watford Field-rd., f., 1,670*l.*

MARCH 20.—By *Weston & Sons:* 30, Stockwell pk. Cres., Clapham, f., 650*l.*; 45, Wiltshire-rd., Brixton, u.t. 67 yrs., g.r. 8*l.*, 400*l.*—By *Weatherall & Green:* 175 and 177, High-rd., Lee, f., r. 95*l.*, 1,570*l.*; 126, Clapham Pk.-rd., Clapham, f., 620*l.*—By *Fuller, Horsey, Sons & Cassell:* 16, Garnault-pl., Rosebery-Av., u.t. 16 yrs., g.r. 10*l.*, r. 40*l.*, 200*l.*—By *Farebrother, Ellis, Clark & Co.:* 14, 15 and 16, St. Swithin's-lane, City of London, u.t. 72 yrs., g.r. 1,120*l.*, 9,000*l.*; 6, Hanover-ter., Notting-hill, u.t. 44 yrs., g.r. 20*l.*, 900*l.*; 8, Hanover-ter. u.t. 43 yrs., g.r. 15*l.*, r. 125*l*, 810*l.*; 102, 104, 106, 108 and 110, Wilmer-gardens, Hoxton, u.t. 68 yrs., g.r. 55*l.*, r. 105*l.*, 510*l.*

MARCH 21.—*H. J. Bliss & Son:* 4 and 6, Digby-st., Bethnal-green, and 27, Lansdell-pl., f., 300*l.*; 30, Shaftesbury-rd., Hornsey, u.t. 73 yrs., g.r. 6*l.*, 270*l.*; 1 to 7, Conrad-st., Hackney, u t. 52 yrs., g.r. 31*l.* 12s. 6d., 1,260*l.*; 16, 18, and 20, Janet-st., Millwall, u.t. 40 yrs., g.r. 8*l.* 10s., 350*l.*; 28, 30, 32, and 34, Janet-st , u.t. 40 yrs., g.r. 6*l.*, 400*l.*; 44 and 46, Amity-rd, West Ham u.t. 72 yrs., g r. 7*l.* 10s., 180*l.*; 48 and 50, Amity-rd., u.t. 72 yrs., g.r. 7*l.* 10s., 205*l.*—*Newbon & Co.:* 81, 83, 85, and 87, Leighton-rd., Kentish-town, u.t. 46 yrs., g.r. 20*l.* 5s., r. 142*l.*, 1,360*l.*; 53, Colebrook-row, Islington, f., r. 60*l.*, 835*l.*; 61, Highbury-hill, Highbury, u.t. 67 yrs., g.r. 12*l.* 10s., 505*l.*—*C. P. Whiteley:* f.g.r. of 39*l.*, Earlsfield-rd., Wandsworth, reversion in 94 yrs., 948*l.*; f.g.r. of 39*l.*, Sumatra-rd., Hampstead, reversion in 91 yrs., 1,000*l.*; f.g.r. of 49*l.*, Cyrena-ter., Honor Oak, reversion in 93 yrs., 1,185*l.*—*Hobson, Richards & Co.:* l.g.r. of 6*l.*, Dora-st., Limehouse, u.t. 14 yrs., 28*l.*; l.g.r. of 23*l.*, Endive-st., u.t. 14 yrs., 102*l.*; l.g.r. of 23*l.*, Spenlow-st., u t. 14 yrs., 135*l.*; l.g.r. of 4*l.* 10s., Forest-st., Forest-gate, u.t. 64 yrs., 47*l.*; 10 and 12, Dora-st., Limehouse, u.t. 14 yrs., g.r. 6*l.*, 80*l.*; 21 and 23, Dora-st., u.t. 14 yrs, no g.r., 130*l.*; 31, Dora-st., u.t. 14 yrs., no g.r., 60*l.*; 9 and 10, Endive-st., u.t. 14 yrs., g.r. 4*l.*, 105*l.*; 40, 42, 44, 44a, and 46, Forest-st., Forest-gate, u.t 64 yrs., g.r. 13*l.* 10s., 320*l.*; 179 and 181, Jubilee-st., Mile-end, u.t. 11 yrs., g.r. 6*l.*, r. 55*l.* 4s., 135*l.*; 3, 5, and 7, Rectory-rd., Stoke Newington, u.t. 67 yrs., g.r. 27*l.*, r. 108*l.*, 740*l.*—*Chesterton & Sons;* 36 and 38, Pembridge-rd., Notting-hill, u.t. 58 yrs., g.r. 14*l.*, r. 107*l.*, 1,130*l.*; 4, 6, and 8, Holland-st., Kensington, f., r. 190*l.*, 3,465*l.*; 31, Gloucester-rd., u.t. 57 yrs., g.r. 15*l.*, r. 185*l.*, 2,700*l.*; A Plot of Land, Berrymead-rd., Acton-green, f., 120*l.*—*Stimson & Sons:* 30 to 36 even, Marlborough-rd , Old Kent-rd., f., 1,450*l.*; 56, Lyndhurst-grove, Peckham, f., 1,230*l.*; 58 to 74 even, Lyndhurst-grove, f., r. 260*l.*, 3,665*l.*; 137, 139, and 141, Blake's-rd., f., 920*l.*; 9 to 19 odd, Gloucester-rd., Croydon, f., 860*l.*; 24 to 33 odd, Gloucester-road, f., 920*l.*; 16, Linnell-rd., Camberwell, u t. 71 yrs., g.r. 7*l.*, r. 40*l.* 350*l.*; 12, Linnell-rd., u.t. 71 yrs., g.r. 6*l.*. r. 34*l.*, 290*l.*; 14 and 16, Lyndhurst-gr., u.t. 71 yrs., g.r. 10*l.*, 375*l.*; 16, Linom-rd., Clapham, u.t. 71 yrs., g.r. 5*l.* 10s., r. 28*l.*, 210*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a, for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	8/0/0 9/0/0
Teak, E.I.	load	10/0/0 16/0/0
Sequola, U.S. ft. cu		1/10 2/2
Ash, Canada load		2/15/0 4/0/0
Birch, do.		2/15/0 4/0/0
Elm, do.		3/10/0 4/15/0
Fir, Dantsic, &c.		1/10/0 3/5/0
Oak, do.		2/15/0 4/15/0
Canada		5/10/0 7/0/0
Pine, Canada red		2/15/0 3/5/0
Do. Yellow		3/5/0 5/10/0
Lath, Dantsic, fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10/0
Wainscot, Riga, &c., log		3/0/0 5/5/0
Odessa, crown		3/0/0 5/5/0
Deals, Finland		
2nd & 1st std	100	7/0/0 8/10/0
Do. 4th & 3rd		7/0/0 8/0/0
Do. Riga		7/0/0 8/0/0
St. Petersburg, 1st yellow		9/10/0 12/0/0
Do. 2nd yellow		7/10/0 9/0/0
Do. white		8/0/0 9/10/0
Swedish		7/0/0 15/10/0
White Sea		7/10/0 15/0/0
Canada, Pine 1st		21/0/0 24/10/0
Do. do. 2nd		16/10/0 17/10/0
Do. do. 3rd, &c.		8/0/0 10/5/0
Do. Spruce, 1st		8/10/0 10/0/0
Do. do. 3rd and 2nd		6/10/0 7/5/0
New Brunswick		6/0/0 7/0/0
Battens, all kinds		5/0/0 21/0/0
Flooring boards, sq., 1 in. prep. 1st		0/9/0 0/14/0
Do. 2nd		0/6/0 0/11/0
Other qualities—		0/4/6 0/7/0
Cedar, Cuba	ft.	/3 /4
Honduras, &c.		/3 /4½
Mahogany, Cuba		/3½ /6
St. Domingo, cargo av.		/3½ 1/6
Mexican do. do.		/3 /4
Tobasco do. do.		/3½ /6
Honduras do. do.		/3½ /5½
Box, Turkey ton		4/0/0 15/0/0
Rose, Rio		7/0/0 16/0/0
Bahia		6/0/0 15/0/0
Satin, St. Domingo		0/0/5 0/1/0

TIMBER (*continued*).		
Satin, Porto Rico		0/0/6 0/1/6
Walnut, Italian		0/0/3½ 0/0/7
METALS.		
Iron—Pig, in Scotland	ton	2/1/10 0/0/0
Bar, Welsh, in London		5/12/6 5/15/0
Do. do. at works in Wales		5/2/6 5/5/0
Do. Staffordshire, in London		6/0/0 6/10/0
COPPER—British cake and ingot		41/10/0 42/0/0
Best selected		42/5/0 42/15/0
Sheets, strong		49/0/0 0/0/0
Chili bars		39/1/3 39/0/3
YELLOW METAL	lb	0/0/4 0/0/4½
LEAD—Pig, Spanish	ton	9/18/9 0/0/0
English com. brands		10/0/0 10/1/3
Sheet, English, 6 lbs. per sq. ft. and upwards		10/15/0 11/0/0
Pipe		11/15/0 0/0/0
ZINC—English sheet	ton	18/10/0 19/0/0
Vieille Montagne		19/10/0 0/0/0
TIN—Straits		62/17/6 63/7/6
Australian		63/7/6 63/17/6
English Ingots		66/0/0 66/10/0
Banca		62/15/0 63/0/0
Billiton		62/10/0 62/15/0
OILS.		
Linseed	ton	19/15/0 20/0/0
Cocoanut, Cochin		24/15/0 0/0/0
Do. Ceylon		22/15/0 0/0/0
Palm, Lagos		23/0/0 0/0/0
Rapeseed, English pale		22/5/0 22/10/0
Do. brown		20/15/0 21/0/0
Cottonseed ref.		17/0/0 17/15/0
Oleine		19/10/0 21/10/0
Lubricating, U.S.		4/0/0 5/0/0
Do. refined		5/0/0 12/0/0
TAR—Stockholm	barrel	1/1/0 1/1/6
Archangel		0/16/0 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

ALDEBURGH (Suffolk).—For new shop and additions, for Mr. G. Norris. Mr. T. E. Key, architect, 5, Bloomsbury-square, W.C., and Aldeburgh:—

Cooper & Sons	£294 0	Knowles, Aldeburgh*	£262 0
Stannard	271 3		

* Accepted.

BARKING (Essex).—For new Board school, cookery centre, and caretaker's cottage, North-street, for the Barking School Board. Mr. C. J. Dawson, architect, Barking. Quantities by Messrs. Gardner, Son, & Theobald:—

Oldridge & Sons	£28,847	F. J. Coxhead	£23,796
Thomas Boyce	25,721	W. Watson	23,435
Stephens, Bastow, & Co.	25,899	Holliday & Greenwood	23,140
Foster & Dicksee	24,729	Lansdowne & Co.	22,771
Holland & Hannen	24,470	Rider & Sons	22,760
Gregar & Son	24,359	Holloway Bros.	22,015
Reed & Son	24,332	Mowlem & Co.*	22,194
Kirk & Randall	23,800	W. Shepherd	22,016

* Accepted subject to sanction of Education Department.

BRADFORD (Yorks.).—For the erection of a warehouse, Cliftonstreet, Manningham-lane. Messrs. Empsall & Clarkson, architects, 55, Tyrrel-street, Bradford:—

Masonry.—C. Booth & Sons, Bradford	£3,000
Joinery.—J. Deacon, Shipley	
Ironwork.—Taylor & Parsons, Bradford	
Plumbing.—Job Wood, Bradford	
Plastering.—A. Taylor, Eccleshill	
Slating.—T. Nelson, Bradford	

CANTERBURY.—For restoring the chancel of Holy Cross Church, Canterbury, for Mrs. Molony. Mr. E. P. Loftus Brock, architect:—

Lovell & Sons	£275	W. J. Adcock	£268
J. J. Wise	271	H. B. Wilson	263
H. W. Bateman	270		

CANTERBURY.—For the construction of roof to nave and north aisle of St. Nicholas' Church, Ash, for the Vicar and Churchwardens. Mr. Edwd. W. Fry, architect, St. Martin's House, Dover. Quantities by architect:—

W. Judges	£689	Martin	£618
G. H. Deane & Son	684	J. Busley, Ash (accepted)	600
W. Cozens	639	T. H. Lovell & Sons	545
E. B. Badcock & Massey	620	A. Elgar Nunn	517

CHIEVELEY (Berks).—For rebuilding stabling, &c., at the "Hare and Hounds" hotel, for Mr. H. J. Finn. Mr. Walter H. Bell, architect, Market-place, Newbury:—

E. C. James	£218 0	T. Taylor	£196 10
C. Wicks	207 12	J. Tarrant (accepted)	185 10

[All of Newbury.]

DARWEN (Lancs.).—Accepted for the erection of eight houses, off Equity-street, for the Darwen Industrial Co-operative Society, Limited. Mr. John B. Thornley, architect, 45, Market-street, Darwen:—

Robert Shorrock, Darwen £1,690

DOVER.—For rebuilding the "Red Lion" Inn, St. James's street, Dover, for Messrs. A. Liney & Co. Messrs. Worstold & Hayward, architects and surveyors, Dover:—

Hayward & Paramor	£1,893 0	H. Stiff (accepted)	£1,765 0
Austen & Lewis	1,771 11		

DOVER.—For rebuilding new shop and premises, for Mr. W. Masters, of 41, Biggin-street, Dover. Mr. Edward W. Fry, architect, St. Martin's House, Dover. Quantities by architect:—

H. Stiff	£1,535	Hayward & Paramor	£1,365
J. Parsons	1,449	H. Richardson	1,330
W. Bromley	1,390	J. J. Hall, Dover (accepted)	1,318
Austin & Lewis	1,370		

FELTHAM.—For making new roads and catch-pits on the Ashfield Park Estate, Feltham. Mr. L. A. Layton, surveyor, Egham:—

	Roads.	Catchpits.	Total.
J. Ball	£1,188 15 0	£195 0 0	£1,383 15 0
Barber	275 12 6	41 5 0	316 17 6
G. Walker	273 0 0	26 5 0	299 5 0
A. W. Yates	260 17 6	37 10 0	298 7 6
C. Mott, Staines*	250 0 0	37 10 0	287 10 0
Surveyor's estimate	275 0 0	25 0 0	300 0 0

* Accepted.

HARROW.—For additions to Victoria Hall. Mr. Francis E. Jones, architect:—

A. Webbe	£740	F. T. Chinchen	£625
Rackham	643	Gullett Bros.	557

HOLBETON (Devon.).—For the erection of school buildings, Mothecombe, for the School Board. Mr. Crosbie, architect, Noss Mayo, Plymouth. Quantities by architect:—

Atwill & Wyatt £246 1

SLEWORTH.—For the construction of two new settling-tanks, filtering-tanks, tumbling-bay, &c., at the Sewage Works, Wykegreen, Isleworth, for the Southall-Norwood Urban District Council. Mr. Thos. Newell, C.E., Southall. Quantities by Messrs. Young & Brown, 7, Southampton-street, Bloomsbury-square, W.C.:—

Nightingale, B. E.	£1,073 0 0	Pierce, G.	£918 12 2
Adams, T.	1,049 0 0	Kavanagh, S.	909 0 0
Wilkinson Bros.	963 0 0	Kitteringham, S.	820 0 0
Hunt, J. R.	930 0 6	Brown, W., Southall*	788 10 0

[Engineer's estimate, £875.]

* Accepted.

KIDDERMINSTER.—For the extension of a weaving-shed, Park Wharf, for Messrs. R. Smith & Sons. Mr. J. M. Gething, architect, Oxford Chambers, Kidderminster:—

Builders' work.

C. A. Horton	£1,196	Geo. Meanley	£955
Thos. Vale	1,090	John Guest & Sons	950
Wm. Willetts	1,047	J. Binnean & Co., Kidderminster (accepted)	892
H. Dorse & Co.	1,027		
A. Smith	984		

Ironfounders' work.

Piggott & Co.	£267 10 0	F. Bradley	£154 13 0
Westwood & Wright	232 10 0	W. & N. Grazebrook, Dudley (accepted)	132 0 0
Cochrane & Co.	218 6 0		
Hill & Smith	168 4 4		

LINCOLN.—Accepted for the erection of new Constitutional Club at the corner of Silver-street and Broadgate. Mr. W Watkins, architect, Lincoln:—

M. Otter & Co. £5,520

[No competition.]

LITTLE BADDOW (Essex).—For additions, &c., to National School buildings, for the managers. Mr. Chas. Pertwee, architect, Chelmsford:—

Ernest West	£378	J. Gozzett	£208
F. Johnson	338	Beckett Bros.	289
H. Potter	335	Ager & Claydon	
E. Saltmarsh	320	A. Woodward	
J. Rayner	305		

LONDON.—For the construction of certain new sewers, and underpinning and repairs to existing sewers, and other works in connexion therewith, in various streets in the St. Giles' district, for the St. Giles' District Board of Works, 197, High Holborn. Mr. G. Wallace, Engineer and Surveyor. Quantities by Messrs. Wakelin & Bare, 9, Southampton-street, W.C.:—

Neave & Son	£3,024	T. Adams	£2,409
Wilkinson, Bros.	2,970	Killingback & Co., James-street, N.W. (accepted)	2,439
W. Walker	2,850		
Mowlem & Co.	2,850		

LONDON.—Accepted for the construction of an underground convenience for men and women, at the junction of Charing Cross-road and New Oxford-street, for the St. Giles's District Board of Works. Mr. G. Wallace, Engineer and Surveyor, 197, High Holborn. Quantities by Messrs. Wakelin & Bare, 9, Southampton-street, W.C.:—

Messrs. C. W. Killingback & Co., James-st., Camden Town, £2,379

LONDON.—For the construction of a steel footbridge and approaches thereto over the railway at Parliament Hill, for the London County Council:—

T. Gibson	£3,428 13 6	G. Palmer*	£2,495 18 4
Darlington Wagon, &c., Co., Lim.	2,865 9 3		

* Accepted.

LONDON.—For the enlargement and alteration of the Clerkenwell station, for the London County Council:—

John Shillitoe & Son	£8,163	Holloway Bros.	£6,857
Thompson & Beveridge	7,245	G. Munday & Son*	6,696
F. Gough & Co.	7,194		

* Accepted.

LONDON.—For the erection of seven houses at Glenwood-road, Catford, S.E. Mr. H. Lewis Upham, architect, Silverdale, Sydenham, S.E.:—

McLoughlin	£3,620	Wadington & Co.	2,940
R. Soper	3,575	A. C. Hoile	2,730
Jones & Groves	3,250	R. H. Walker*	2,723

* Accepted.

LONDON.—For alterations to the "Victoria" Tavern, Hackney Wick, for Mr. Charles Elledge. Mr. Horace M. Wakley, architect, Adam-street, Adelphi. No quantities:—

Edwards & Medway	£997	Shepherd Bros.	£898
Hawkins	969	Hood, 471, Bethnal Green-road (accepted)	887
Pritchard & Kant	923		
Stevens Bros.	917		

LONDON.—For rebuilding premises in Fulwood's Rents, Holborn, for Mr. H. T. Culliford. Mr. F. T. W. Goldsmith, architect, 1, Verulam-buildings, Gray's Inn. Quantities by Mr. J. F. Bull, 30, Bedford-row:—

Oldrey & Sons	£3,587	J. Johnson	£3,009
Lascelles	3,279	Creaton & Co.	2,989
Earl & Sons	3,066	Godfrey & Son	2,956
H. J. Williams	3,065	Thompson (too late)	

LONDON.—For the supply and fixing of a new sludge loading pipe, hydraulic piping and jigger, and safety chains required in connexion with the alterations to the pier at the Barking outfall works, for the London County Council:—

The Thames Ironworks Co., Ltd.	£2,007 18 2	Phœnix Foundry Co.	£1,586 6 1
Richard Moreland & Son	1,839 0 0	The Glenfield Co., Ltd.	1,577 3 6
		John Lysaght, Ltd.	1,374 13 6

LONDON.—For carrying out alterations to the school buildings in Abbey-street, Bethnal Green, in order to adapt the premises for the purposes of cookery, laundry, manual training, and housewifery centres, and also as a school for special instruction, for the School Board for London. Mr. T. J. Bailey, Architect:—

G. S. S. Williams & Sons	£4,285	Willmott & Sons	£3,850
Reed & Son	4,204	W. Gregar & Son	3,839
Grover & Son	3,994	Calnan & Co., 238, Commercial-road, E.*	3,676
Lawrance & Sons	3,875		

* Recommended for acceptance by the Works Committee.

LONDON.—For constructing new offices for the boys and teachers of the Compton-street School, Goswell-road, for rearranging the urinals, re-connecting the drains to the girls' and infants' offices, and providing a new system of drainage at the same time, for the School Board for London. Mr. T. J. Bailey, Architect:—

Knight & Son	£1,399	G. Newton, 10, Southwark-street*	£1,175
Kirby & Chase	1,380		
H. Mallett	1,189		

* Recommended for acceptance by the Works Committee.

LONDON.—For the erection of stabling for forty horses; farrier's shop, forage store, harness-room, and manure-pit, at Lansdown-hill, Lower Norwood, S.E., for the London Southern Tramways Co. Mr. J. R. Manning, architect, Milkwood Estate Office, Herne-hill, S.E. Quantities by the architect:—

	Stabling.	Farrier's Shop.	Forage Store, Harness-room, and Manure-pit.	Alteration to present Farrier's Shop for 10 Horses.
	£ s.	£ s.	£ s.	£ s. d.
F. & H. F. Higgs.	884 0	80 0	92 0	40 0 0
J. Hooper	883 10	92 0	88 0	39 0 0
Holliday & Greenwood	860 0	85 0	95 0	33 0 0
T. H. Rodwell	847 0	78 2	110 17	29 6

HENDON.—Accepted for the supply of road materials for the Hendon Urban District Council:—

	Material.	Midland Railway Stations. Mill Hill.	Hendon.	Childs Hill.	Great Northern Railway. Mill Hill.	Finchley.	Edgware.
		per ton. s. d.	per ton. s. d.	per ton. s. d.	per ton. s. d.	per ton. s. d.	per ton. s. d.
Narborough and Enderby Granite Co.	Granite	10 0	10 0	10 0	10 0	10 3	10 3
H. Wiltmott	Hand-picked Flints	8 0	8 0	8 0	8 0	8 0	8 0
" "	Pit Flints	6 3	6 0	6 0	6 3	6 2	6 4
" "	Double-screened Hoggin	6 3	6 0	6 0	6 3	6 2	6 4
" "	Single-screened Hoggin	5 6	5 3	5 3	5 6	5 5	5 7
Constable & Co.	Limestone Chippings	10 6	10 6	10 6	12 0	12 0	12 0
J. Dickson	2½-in. Slag	6 7	6 7	7 0	7 6	7 1	7 1
" "	4-in. Slag	5 0	5 0	5 3	6 0	5 6	5 6

LONDON.—For cleaning and painting at the Edinburgh-road Schools, for the School Board for London:—

R. E. Williams & Sons	£290	G. Williams	£179
S. Polden	220	W. Hammond	179
Hornett	213	F. T. Chinchen (accepted)	139
G. Foxley	202	W. Brown	92
H. C. Clifton	194		

LONDON.—For cleaning at "The Fox" Schools, for the School Board for London:—

S. Polden	£146	G. Foxley	£115
Graham & Graham	145	W. Brown	89
Stimpson & Co.	140	F. T. Chinchen	89
G. Williams	116		

LONDON.—For carrying out alterations and improvements to the Winchester-street School, Pentonville, for the School Board for London. Mr. T. J. Bailey, Architect:—

R. A. Yerbury & Sons	£8,010	John Grover & Son	7,340
James Longley & Co.	7,703	C. Cox	7,290
J. & M. Patrick	7,559	E. Lawrance & Sons	7,026
Killby & Gayford	7,526	W. M. Dabbs, Portland-avenue, Stamford Hill, N.*	6,989
G. S. S. Williams & Sons	7,347		

* Recommended for acceptance by the Works Committee.

NEWPORT (Mon.).—For pulling down and rebuilding Nos. 142 and 143, Commercial-street, Newport (Mon.), for Mr. Charles Collier. Mr. F. R. Bates, architect, 4, Commercial-street, Newport. Quantities by architect:—

Charles Locke	£3,255	John Linton	£2,999
Geo. Wilkins	3,210	Edwyn Richards*	2,990
T. G. Diamond	3,096		

* Accepted.
[All of Newport.]

NOTTINGHAM.—For the erection of police-station, &c., Gregory-boulevard, for the Corporation. Mr. Arthur Brown, C.E., Borough Engineer, Guildhall, Nottingham:—

Thos. Cuthbert	£6,900 0	Gilbert & Gabbitass	£6,660 0
J. Hodson & Son	6,862 0	J. Adams, Colville-street, Nottingham*	6,600 0
W. Gell & Sons	6,775 0	F. Messom (withdrawn)	6,300 0
A. G. Bell	6,737 10		

* Accepted.

SEVENOAKS.—For the supply of road-metal, &c., for the Urban District Council. Mr. Jabez Mann, C.E., Surveyor, Argyle-road, Sevenoaks:—

		Per Yd. s. d.	s. d.
Geo. Rye	550 yds. of broken local stone at	4 6 to 5	3
Philip Bagwell	400 " " "	4 10 to 5	9
E. B. Chittenden	200 " " "	4 11	
" "	50 yds. of unbroken stone at	4 5	

SHEFFIELD.—For the drainage of Firvale workhouse, asylum, hospital, &c., Firvale, for the Guardians. Mr. T. Aird Murray, C.E., Independent Buildings, Sheffield:—

W. Williamson	£2,529 8 4	G. Nadin	£1,839 5 9
J. B. Harris	2,055 11 6	Geo. Hall	1,839 0 0
Geo. Carr	2,050 0 0	John Hill	1,782 13 0
C. A. Walker	1,954 11 2	F. Eyre	1,752 8 11
J. Wilson & Sons, L. & N. W. Goods Station, Sheffield*	1,909 15 3		

* Accepted.

SOUTH MOLTON (Devon).—For re-building the north wing of the Workhouse, for the Union Guardians. Mr. Arnold Thorne, architect, Barnstaple:—

W. Sanders & Son	£696	Comins & Cotty	£620
Parminter & Sillifant	649	Bowdru & Sillifant, South Molton (accepted)	599

STRATTON ST. MARGARET (Wilts.).—For additions, &c., to the workhouse, for the Highworth and Swindon Union Guardians. Mr. W. H. Read, architect, Corn Exchange, Swindon:—

Flewelling	£623 0	Barrett	£563 10
Wiltshire	594 0	Looker, Stratton St. Margaret, near Swindon (accepted)	545 5
Chambers	579 0		
Williams	574 0		

SWANSEA.—For the supply of road-metal, for the Corporation. Mr. Geo. Bell, C.E., Borough Surveyor, 13, Somerset-place, Swansea:—

Syenite broken to 2½-in. gauge.

	Tons.		s. d.
W. Griffiths, Kingsland-rd., London	1,000 Guernsey	at	9 3
Clee Hill Granite Co., Ludlow, Salop	500 Clee Hill		12 11
Brundritt & Co., Runcorn	1,000 Penmaenmawr		9 0
Kneeshaw, Lupton, & Co., 41, Old Hall-st., Liverpool	1,000 North Wales		8 2
Coverack Stone Co., 76, Finsbury-pavement, London	500 Coverack		9 0
Jas. Runnalls, Penzance	1,000 Penlee		8 6
Joseph Weir, Rostrevor, Ireland	500 Rostrevor		7 6
Forester & Co., Swansea	500 Mill Stone Grit		8 6

Limestone broken.

	Tons.		Per ton. s. d.
J. K. Clement, Mumbles	150 Mumbles No. 1 district, d/d	at	5 0
" "	150 " " 2 " "		5 10
Thorne & Sons, "	150 " " 1 " "		4 5
" "	150 " " 2 " "		5 5
			Per yard.
Wm. Bevan, Tregernydd Farm, Swansea	150 Native	"	5 6

Limestone unbroken.

Penwyllt Dinas Silica Brick Co., Penwyllt, near Neath, 420 tons Penwyllt d/d Morriston Station at 3s. 4d. per ton.
Penwyllt Dinas Silica Brick Co., Penwyllt, near Neath, 185 tons Penwyllt d/d Landore Station at 4s. 5d. per ton.
Breconshire Coal and Lime Co., Brecon, 420 tons Penwyllt d/d Morriston Station at 3s. 4d. per ton.

WARRINGTON.—For the erection of modelling-room at the School of Art; also shed at the Museum, for the Corporation. Mr. Thos. Longdin, Borough Surveyor, Town-hall, Warrington:—

Rooms at School of Art.—J. Ewart	£238
Shed at Museum.—J. Ewart	140

WICKLOW (Ireland).—For the erection of wrought-iron and steel overhanging footpath over the River Ovoca, for the Grand Jury of the County Wicklow. Mr. Carter Draper, M.Inst.C.E., County Surveyor, 26, Grosvenor-road, Rathmines, Dublin:—

	Concrete Path.	Oak Path.
F. Morton & Co., Garston, Liverpool	£529	£745
A. & F. Main & Co., 11, Leinster-street, Dublin	735	790
Dalmuir Bridge & Roof Works, Dalmuir, Glasgow	£843*	
J. O. Brettell, Foregate, Worcester	840	967

* Tender does not state if for oak or concrete path.

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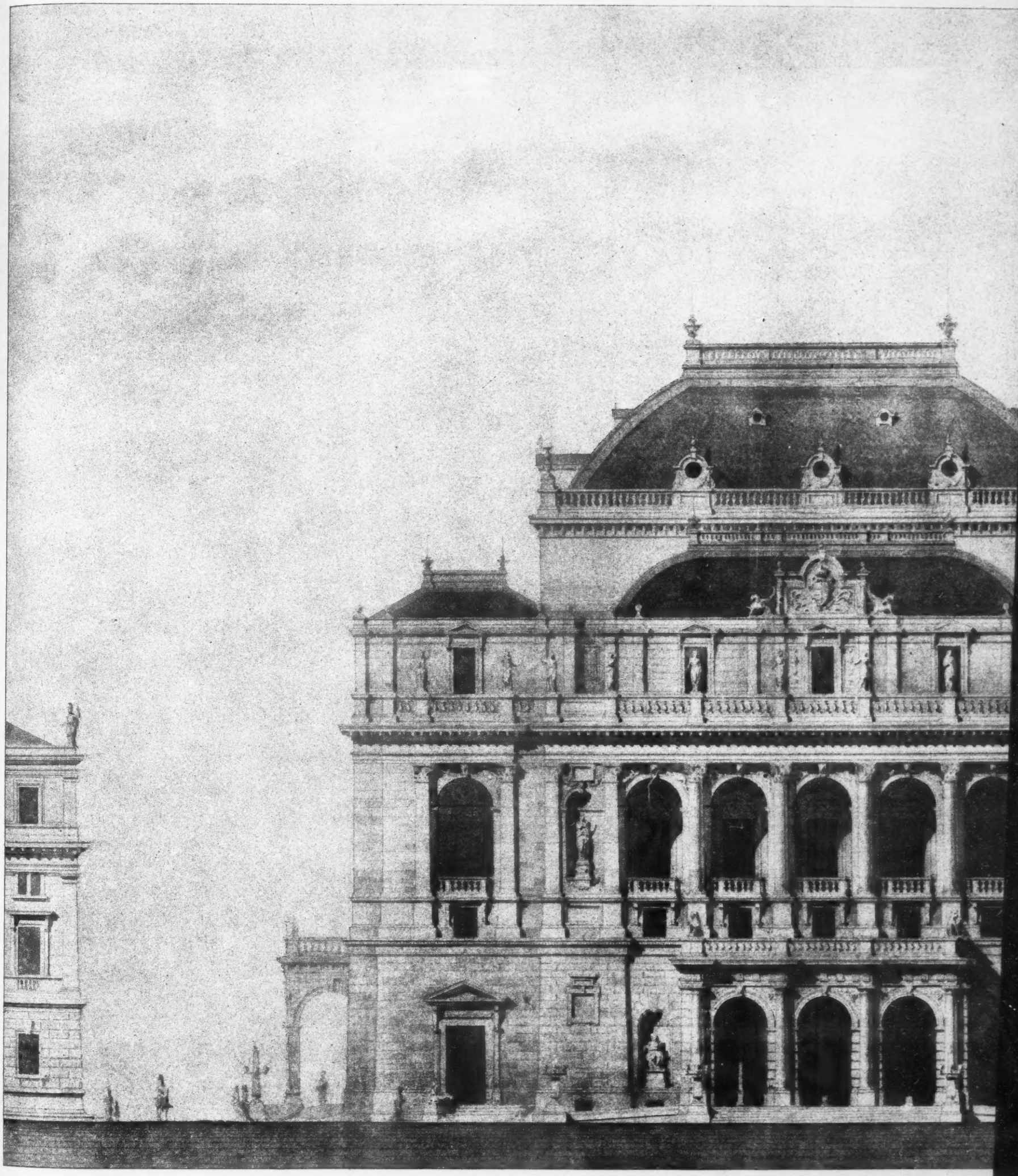
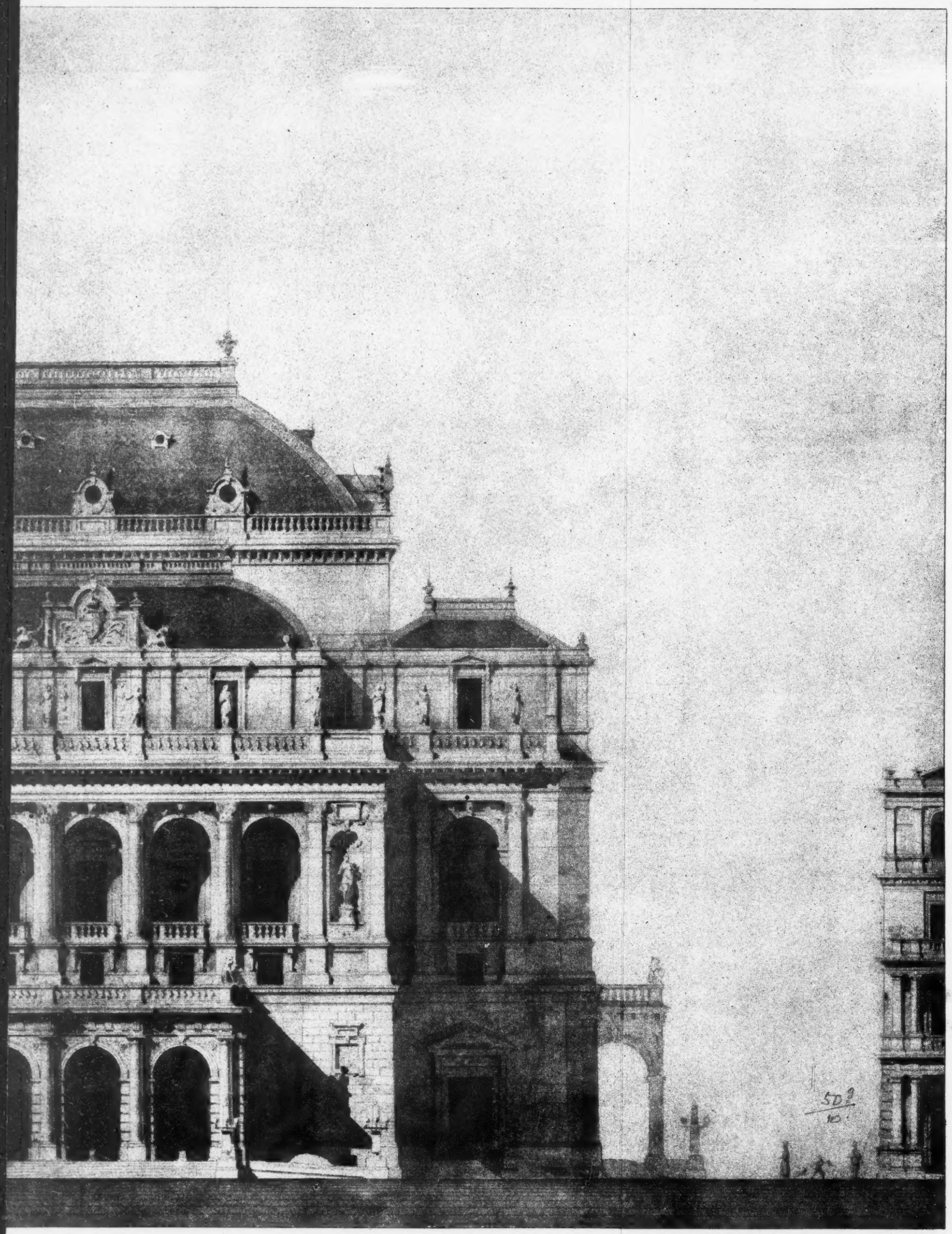


Metres.

NATIONAL OPERA HOUSE, BUDAPEST.—The late Herr Von Ib



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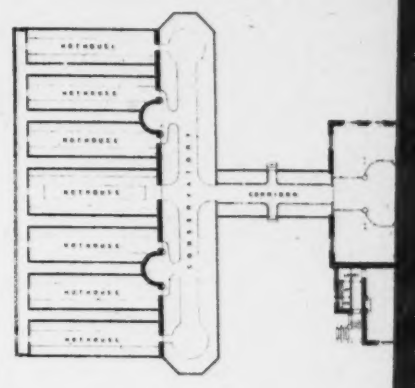
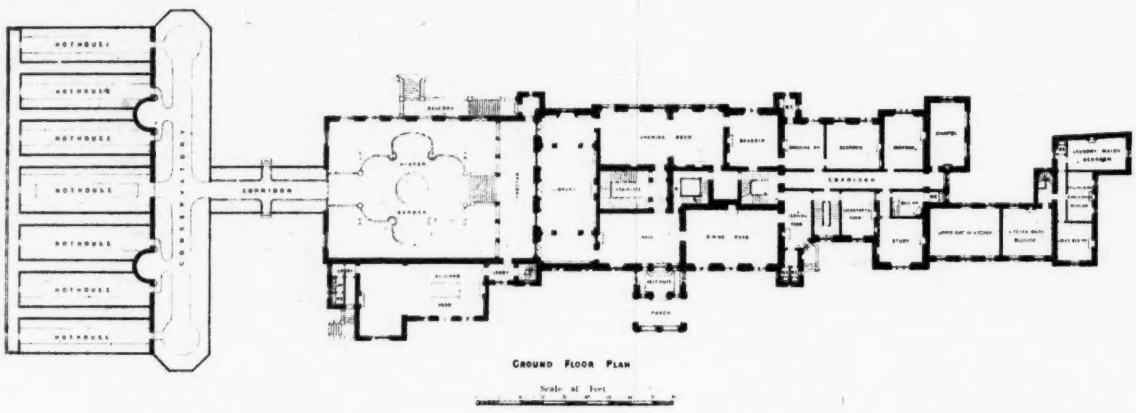
E, BUDAPEST.—THE LATE HERR VON IBYL, ARCHITECT.

EASTWELL PARK.



EASTWELL PARK: ADDITIONS AND NEW FRONT.—Mr. W. Wallace, Architect.

EASTWELL PARK.



GROUND FLOOR PLAN

Scale of Feet

William Wallace

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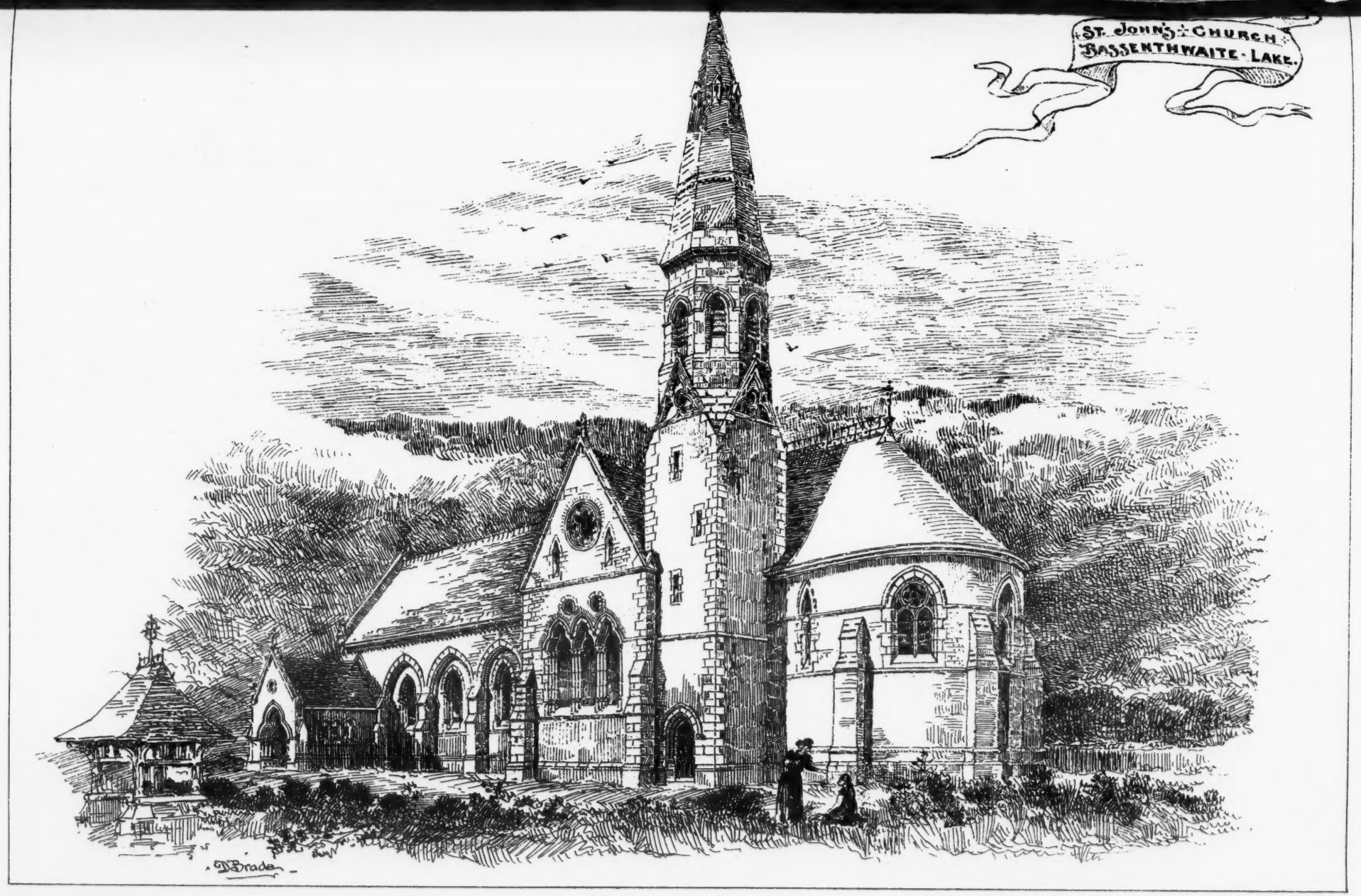
AND NEW FRONT.—Mr. W. Wallace, Architect.



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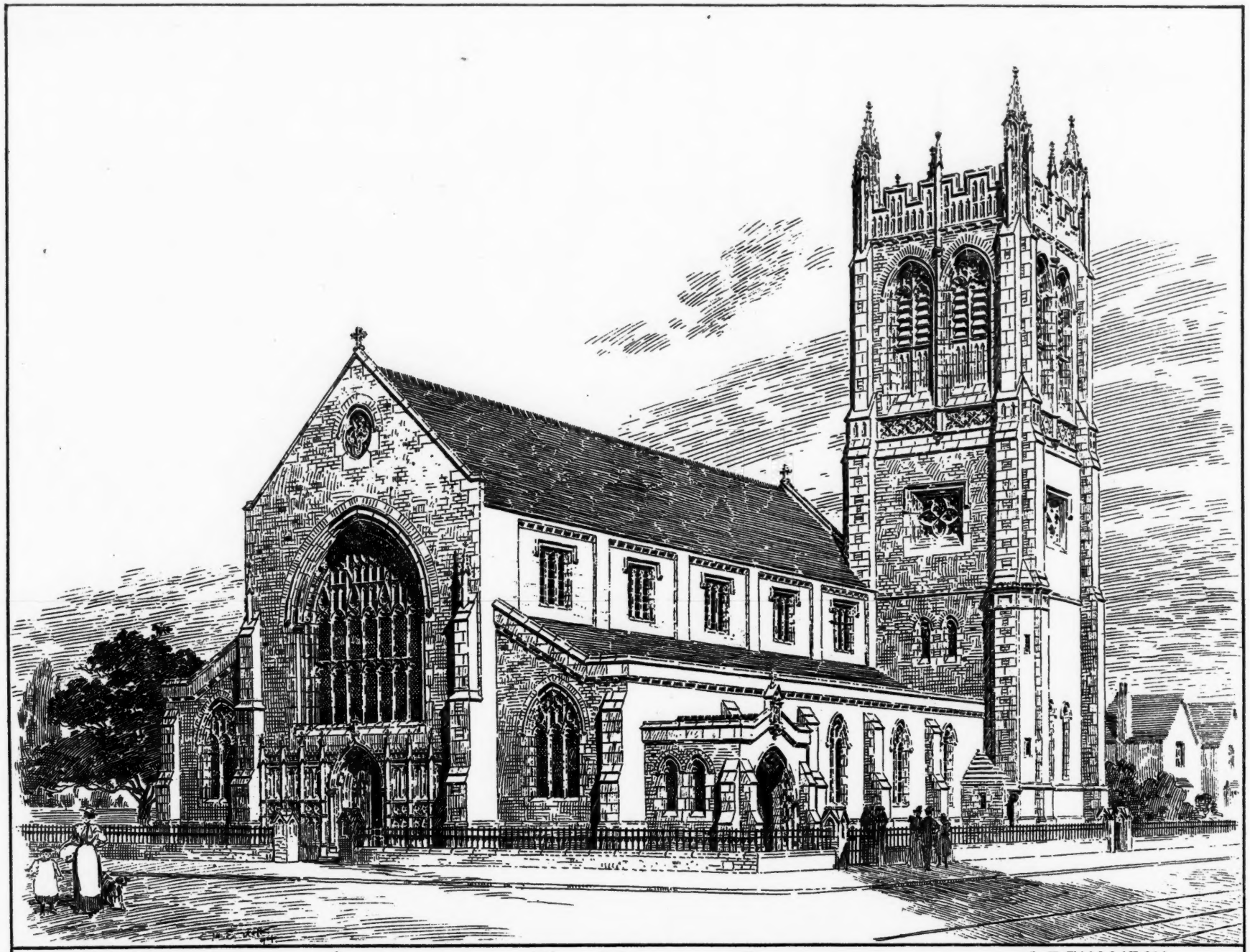

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G. E. HALLIDAY. ARCHITECT.

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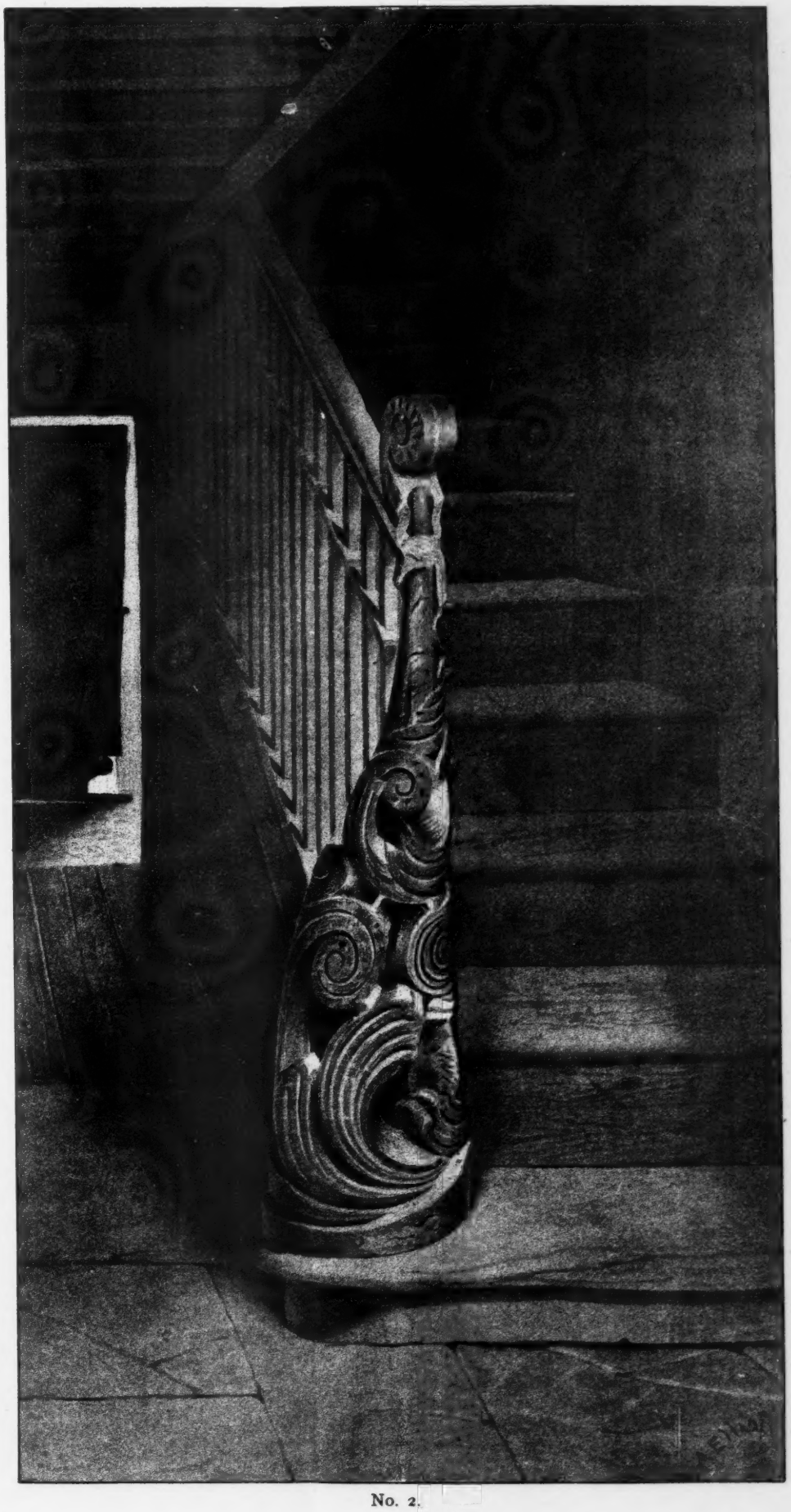

No. 2.

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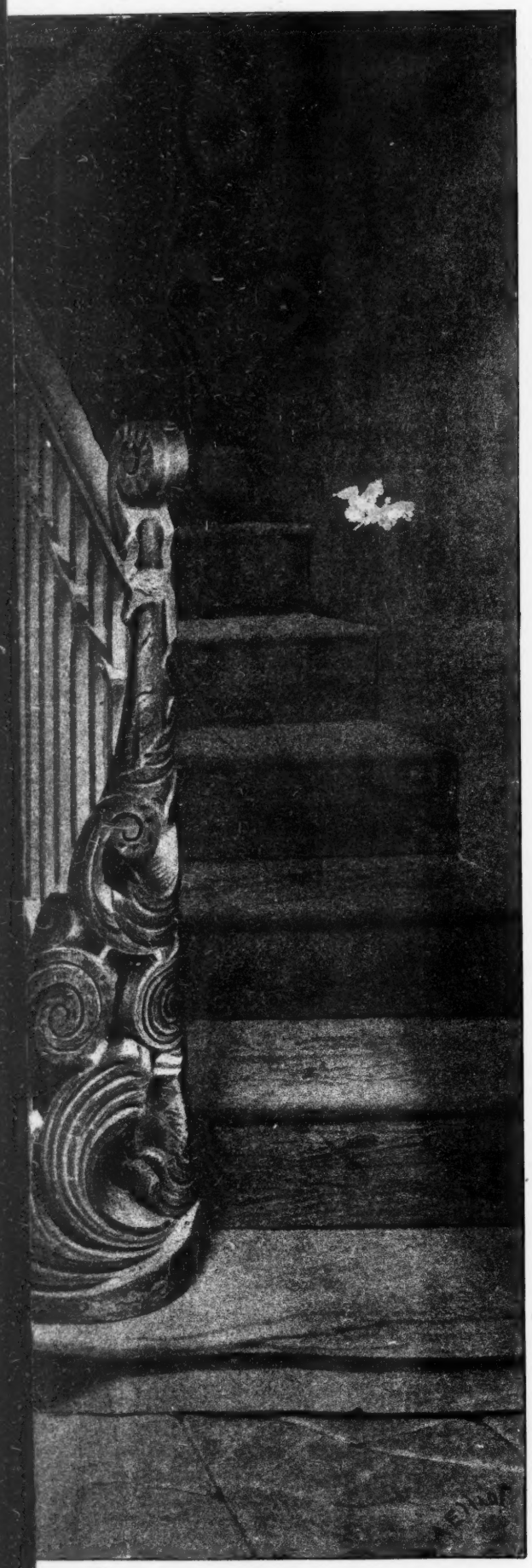

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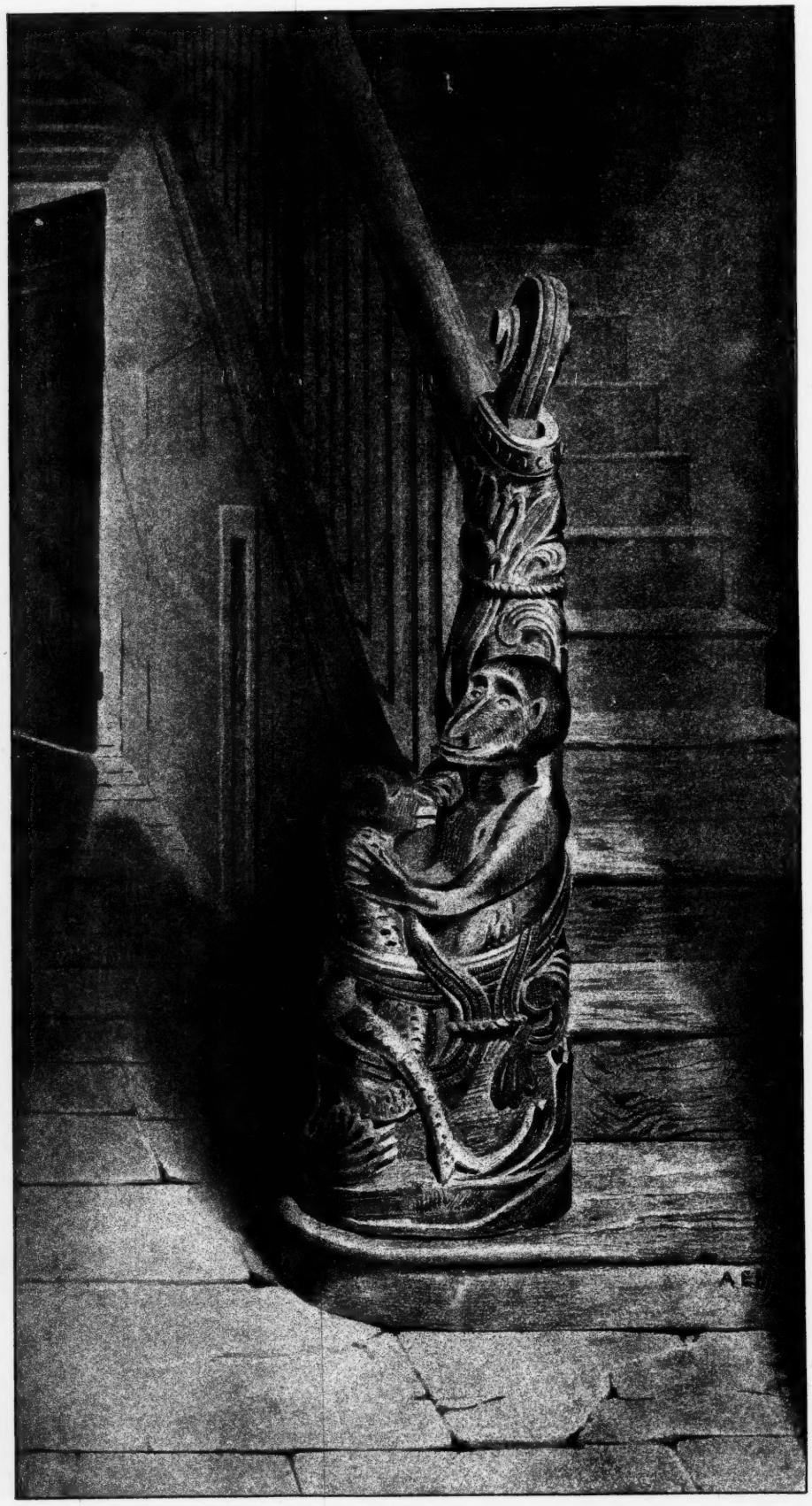

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JEWELS AT ARGELÉS (HAUTES PYRENÉES).